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KNOWLEDGE OF FOOD QUALITY AND ADDITIVES AND ITS IMPACT ON FOOD PREFERENCE

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ABSTRACT

Background. There are not enough published investigations concerning knowledge on food quality and preference of highly educated young consumers from Bosnia and Herzegovina. The present research was aimed at survey of young consumers' knowledge on food quality and food additives and its impact on food preference.
Material and methods. Respondents' answers were analysed grouped regarding: (1) education, on subjects with knowledge on food quality and additives (A-group) and average consumer representatives (B-group); (2) female and male gender. The questionnaire consists of (a) questions with personal data; questions referred to the importance of individual factors for consumers' food choice, related to: (b) fundamental knowledge on food quality and food additives; (c) nutrition and desire to consume food that contains additives; (d) knowledge on monosodium glutamate and desire to consume food containing monosodium glutamate.
Results. Results indicated a statistically significant difference between A-group and B-group, and between female and male subjects, on fundamental knowledge on food quality and additives, but there was no difference in habits regarding nutrition and desire to consume food that contains additives. Respondents in A-group significantly more avoid products containing monosodium glutamate comparing to B-group, but there was no difference between female and male subjects preference.
Conclusions. This research has shown that students from A-group had more knowledge and awareness in choices of food they prefer to consume, than students from B-group. It is recommended to take actions on young consumers' education as contribution to protecting of the health, safety, economic and legal interests of consumers and society.

Key words: young consumers, food preference, additives

INTRODUCTION

Consumer research is difficult and all available information should be taken in consideration, as individual differences between consumers, consumers' knowledge, thinking and behaviour in the environment, and all aspects of the marketer's promotion which influence the consumer purchase decisions [Garber et al. 2003, Grunert et al. 2010, Becker et al. 2011]. Not everyone likes or appreciates, or is familiar with every food category and its composition or processing method [Wurdemann et al. 2011], therefore, it is important in consumer studies to incorporate subjects which are representative of those who like and are regular consumers of certain food on the target market. Unfortunately, there are not enough published

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investigations concerning food choice, knowledge on food quality and preference of college students, as young consumers from Bosnia and Herzegovina.

Consumers' food preference

Many factors shape consumers food preference, as personal roles and experiences, social, cultural and physical environments to which a person has been exposed [Wansink et al. 2003, Davies and Smith 2004, Tengvall and Ellegard 2007, Hamadeh and Marquis 2008, Batrinou and Kanellou 2009, Dickson-Spillmann et al. 2011]. Life course generates a set of influences (ideals, personal factors, resources, social framework and food context) and shapes people's personal systems. Personal system includes conscious value negotiations, as sensory perceptions, monetary considerations, convenience, health and nutrition, quality, and managing relationships [Davies and Smith 2004, Hamadeh and Marquis 2008]. Davies and Wright [1994] revealed that consumers perceived unhealthiness of additives, do not read labels, and half of all respondents were unable to give a single example of a food additive.

MONOSODIUM GLUTAMATE USE, SAFETY AND FOOD PALATABILITY

Consumers express concerns about chemicals in their diet [Dickson-Spillmann et al. 2011]. Additives are chemical substances that should be used in accordance with good manufacturing practice, at a level not higher than is necessary to achieve the intended purpose and provided that they do not mislead the consumer. Taste plays a major role in determining food palatability, which promotes selection, intake, absorption and digestion of foods. Umami is a characteristic taste imparted by glutamate, which is naturally present in many foods and play important roles in the taste, palatability and acceptability of foods increasing the flavour characteristics, mouth fullness, impact, mildness and thickness or enjoyment of the food around the world [Garattini 2000, Halpern 2000, Yamaguchi and Ninomiya 2000]. Monosodium glutamate (MSG) is flavour enhancer, additive which enhances the existing taste and/or odour of a foodstuff [European... 1995]. The total dietary intakes of glutamates, arising from their use at levels necessary to achieve the desired technological effect do not represent a hazard to health. The results of the conducted research suggested that large doses of MSG given without food may elicit some symptoms, but they were not observed when MSG was given with food [FSANZ 2000, Garattini 2000, Geha et al. 2000, Walker and Lupien 2000]. Purity criteria for the monosodium glutamate (E621) are established [Commission... 2001] and maximum level of use monosodium glutamate is 10 $g \cdot kg^{-1}$, which refer to foodstuffs in general ready for consumption and prepared following manufacturers' instructions (with some exceptions), and in condiments and seasonings is used in *quantum satis* [European... 1995].

Additives have important role in food production. They are added to food to achieve, modify and maintain its technological and sensory quality, or to enhance convenience for the consumers. Educated young people are the creators of the future of society, and their knowledge about food quality and nutrition can affect the entire interests of society, and on the offer, selection and consumption of food, health and working ability of residents and on the social and economic situation in Bosnia and Herzegovina as developing country.

The present research was aimed at survey of highly educated young consumers' knowledge about food quality and food additives and its impact on food choice within the observed population, grouped based on: (1) education and (2) gender.

METHODOLOGY OF THE SURVEY

Participants

The study included 109 students (54.13% or 59 were female and 45.87% or 50 were male) ages 22-33 (mean age = 25), in the final years of undergraduate study at the University of Banja Luka, Bosnia and Herzegovina (BA), grouped, based on education and on gender. A-group had 47% of surveyed or 51 (68% female and 32% male) students of the third and fourth year of undergraduate study on Faculty of Food Technology and Nutrition, including all available students, young consumers with fundamental knowledge on food quality and food additives. Formed B-group was similar size, with 58 students of other faculties (42% female and 58% male) or 53% of the surveyed, of whom, none of them had nutrition or food science

course. They were observed as representatives of average young consumers. It was not possible to influence the number of females and males, so that status was only registered.

Procedure

The study was realized on the University of Banja Luka (BA), offering the students printed form with list of prepared questions or statements, to which they answered YES or NO. They spent approximately 10 minutes on answers. The questionnaire consisted of questions divided into the groups. The first part of the questionnaire (a) contained 6 questions with personal data (name of faculty, years of study, age, gender, health and economic status). The other questions referred to the importance of individual factors for consumers' food choice, and were as follows: (b) 8 questions related to the fundamental knowledge on food quality and food additives; (c) 8 questions related to the nutrition and desire to consume food that contains additives; and the last contained (d) 5 questions related to knowledge on monosodium glutamate (MSG) and desire to consume food containing additive MSG.

Data analysis

The Statistical Analysis and testing hypotheses was used to conduct all the analyses of this study with the level of significance $p < 0.05$. The comparison data between the responses from A-group and B-group, also between male and female subjects were performed by Chi-square analysis ($\chi^2_{1;0.05} = 3.841$; $p < 0.05$) to determine students' current eating preferences and knowledge [StatistiXL Toolpak SPSS 1.8 for Microsoft Excel Analysis].

RESULTS AND DISCUSSION

Economic status influence on food consumption

One of the most important parameters influencing food consumption pattern are income level and lack of nutrition knowledge. Unusan [2006] found that the problem is not just in the unavailability of foods, but its uneven distribution among socio-economic, gender and age groups. O'Key and Hugh-Jones [2010] explained food choice related to the culture, and mothers impact on their children's dietary needs and preferences.

In the first part of the questionnaire in our study, students answered questions with personal data, as name of their faculty, years of study, personal age, gender, health and economic status. Based on the data, breakdown by economic status was neglected during the test, because of unequal relations between subjects: a greater number of respondents (86.24%) answered that they had satisfactory, and a small number of respondents (13.76%) that they had a low standard of living.

Impact of health on nutrition

There is still a large number of investigators who reported the results obtained using questionnaires about attitudes and values and relating their results to actual food choice [Köster 2003]. Ready meal consumption could be dependent on sensory- and health-related aspects [Costa et al. 2003, 2004, 2007]. Family have important impact on development of attitudes and behaviours that promote health and prevent disease, childhood food preferences [Kowalczuk 2007] and university students' food preferences development [Unusan 2006].

In our survey, due to the large differences in the number of respondents, the impact of health on nutrition could not be examined, as health status had no impact on the nutrition for 92.66% respondents of the total population surveyed and for 7.34% respondents of the total population, health had impact on nutrition. Analysing the results, it was concluded that there was no statistically significant difference ($\chi^2 = 0.856$, $p < 0.05$) between the responses from A-group and B-group related to the need for a special diet.

Consumers' fundamental knowledge on food quality and food additives

The new position of the consumer in formation of product quality and the market justifies the necessity to pay special attention to learning consumers' needs, expectations, preferences, behaviours and factors affecting it. Knowledge of these factors and relations between them creates an opportunity of a greater influence of the choice, acceptance and consumption of certain food products [Eertmans et al. 2006, Costa et al. 2007, Rybowska and Babicz-Zielińska 2007]. Authorized institutions must ensure quality control and safety products that are offered on the market.

Acknowledgement from our research that the most of students from A-group and from B-group, answered that there is not enough food products quality control on the BA market (questions no. 1 in Table 1), could be seen as alarming.

A better appearance and pleasant taste of some food products is achieved using food additives. In our study, the most respondents from A-group showed high level of knowledge when asked why additives are added to food, and confirmed statements about additives function in preservation of food quality, use of MSG as a flavour enhancer, food regulations and a list of additives whose use is permitted (Table 1). On the other side, respondents from B-group showed less knowledge (Table 1) and some of them did not know or didn't answer on the questions related to the food

Table 1. Questions and statements with responses of A-group and B-group, expressed in percents

Questions and statements related to the fundamental knowledge on food quality and food additives	Responses of A-group %			Responses of B-group %		
	yes	no	didn't respond	yes	no	didn't respond
1. Is there enough control of quality of food products on the market of BA?	4	96	–	12	78	10
2. Do you know why the additives are added to food?	98	2	–	60	38	2
3. Additives allow the preservation of food quality.	94	6	–	59	33	8
4. In food regulations there are a list of additives whose use is permitted.	98	–	2	69	17	14
5. A better appearance and pleasant taste of some food products is achieved using food additives.	98	–	2	88	9	3
6. Consuming "fast food" increases the risk of obesity and health problems.	98	2	–	91	9	–
7. Monosodium glutamate (MSG) E 621 is an additive with flavour enhancer property.	80	16	4	24	29	47
8. Have you noticed the product on the market that contains monosodium glutamate (MSG) or E 621?	41	55	4	16	50	34
9. I eat just because I have to, to maintain normal functioning of my body.	20	80	–	47	52	1
10. I enjoy in food consumption.	92	8	–	71	29	–
11. I try to eat properly.	88	6	6	59	41	–
12. I avoid food products that contain artificial sweeteners.	53	47	–	43	57	–
13. I avoid food products that contain additives.	16	84	–	31	67	–
14. I like to eat *soup from bag* and *soup in a cube*, easy preparing instant products.	41	59	–	60	40	–
15. I like salty, ready to eat meals, which are prepared by heating in a microwave oven.	10	90	–	34	64	2
16. I like to eat salty meals and soups in which are the "mixtures of seasonings with vegetables" added during preparation.	45	55	–	57	40	3

regulations, a list of additives and their use in food processing.

But, it should be stressed that, however, a relatively large number of respondents from A-group as well as from B-group, knew that *a better appearance and pleasant taste of some food products is achieved using food additives*. Statement that consuming "fast food" increases the risk of obesity and health problems, confirmed groups A and B. Based on the responses from group A and from group B to the question whether they *noticed on the market products that contain monosodium glutamate or E 621*, could be concluded that respondents did not have the appropriate level of knowledge about food labels and their use during food products choice and purchasing (questions no. 2-8 in Table 1).

Comparing responses of A-group and B-group on 7 questions (no. 2-8 in Table 1) related to the fundamental knowledge on food quality and food additives it was concluded that the groups had significantly different responses ($\chi^2 = 40.05$, $p < 0.05$), confirming that respondents in A-group (Table 2) have a higher level of knowledge on food additives. Results indicated that there was also a statistically significant difference ($\chi^2 = 7.659$, $p < 0.05$) in attitude (responses) of female and male subjects compared on the level of the total population included in the research, on fundamental knowledge on food quality and additives, and that female students have higher knowledge than male students (Table 3).

People in post-industrial societies are faced with many food products and diverse eating situations that can make food-choice decisions complex [Connors et al. 2001]. Preferences for specific product characteristics vary with different types of consumption situations, food product use and product knowledge [Kowalczuk 2004, Costa et al. 2007]. Food purchasing intentions are influenced with education and information on the importance of healthy eating and living [Kowalczuk 2007, Lobb et al. 2007, Al-Khamees 2009]. Lack of knowledge and products inadequate labelling explains the discrepancy between concern over additives and purchase behaviour [Davies and Wright 1994].

Table 2. Comparison of YES responses between A-group and B-group at the level of the total observed population and responses between the group of female and male subjects

Questions and statements related to the fundamental knowledge on food quality and food additives	YES responses of total population			YES responses of A-group			YES responses of B-group		
	sum	A-group %	B-group %	sum	female %	male %	sum	female %	male %
Consumers' fundamental knowledge on food quality and food additives (questions no. 2-8) $\chi^2 = 40.05$*	546	57	43	**310***	69	31	236	42	58
Nutrition and desire to consume food that contains additives (questions no. 9-16) $\chi^2 = 1.704$	422	45	55	189	66	34	233	40	60
Knowledge on MSG (questions no. 7-8) $\chi^2 = 14.510$*	85	73	27	**62***	68	32	23	35	65
Desire to consume food containing additive MSG (questions no. 14-16) $\chi^2 = 12.499$*	137	36	64	49	67	33	**88***	38	62

* $p < 0.05$; $\chi^2_{1;0.05} = 3.841$.

Table 3. Comparison of YES responses between female and male subjects at the level of the total observed population and classified within A-group and B-group

Questions and statements related to the fundamental knowledge on food quality and food additives	YES responses of total population			YES responses of female			YES responses of male		
	sum	female %	male %	sum	A-group %	B-group %	sum	A-group %	B-group %
Consumers' fundamental knowledge on food quality and food additives (questions no. 2-8) $\chi^2 = 7.659$*	546	58	42	**315***	68	32	231	41	59
Nutrition and desire to consume food that contains additives (questions no. 9-16) $\chi^2 = 2.356$	422	52	48	218	57	43	204	31	69
Knowledge on MSG (questions no. 7-8) $\chi^2 = 1.310$	80	59	41	50	84	16	35	57	43
Desire to consume food containing additive MSG (questions no. 14-16) $\chi^2 = 3.613$	137	48	52	66	50	50	71	23	77

* $p < 0.05$; $\chi^2_{1;0.05} = 3.841$.

Nutrition and desire to consume food that contains additives

Comparison responses of A-group and B-group showed that there was no statistically significant differences ($\chi^2 = 1.704$, $p < 0.05$) in habits between the groups related to the nutrition and desire to consume concentrates of soups as *soup from bag* and *soup in a cube*, or other food products that contains additives (questions no. 9-16 in Table 1). These findings confirmed calculation on relationship between groups A and B expressed in percentage (Table 2), and for comparison of female and male subjects' answers (Table 3). Comparing the level of total tested population, attitude and habits of female and male young people *in terms of nutrition, whether they enjoy the food consumption, whether they are trying to feed properly, to avoid the additives in food* and the like (questions no. 9-16 in Table 1), it was concluded that among them there was no statistically significant difference ($\chi^2 = 2.356$, $p < 0.05$) and that they have similar habits regarding nutrition (Table 3).

Young adults between ages 18 and 34 changes their eating habits and lifestyle comparing to the period under parents controlling food intake. Use of different kinds of concentrates of food in nutrition depends on such social and economical factors as age, education, income and place of living [Kowalczuk 2004]. The relationship between food-related personality traits, specific food choice motives and food intake were investigated [Noble et al. 2003, Eertmans et al. 2005, Kobayashi 2009]. Aspects of food quality and nutrition appear to have a fundamental impact on happiness [Blades 2009]. Good appearance and taste of food lead to consumption of meals. A poor taste, a relatively high price and health considerations are a major obstacle in food choice. Costa et al. [2007] connect food choice with the desire of young people to have more time for other daily activities.

In our study, subjects appeared to be worried about the effects of food consumption on diet and health. Most of respondents from group A and less from group B answered that they *try to eat properly* (Table 1), but some of them confirmed the statement that *they eat just because they have to and to maintain normal functioning of the body*. It is encouraging to realise that a large number of students from group A (Table 1) said that they *enjoy food consumption* and in that way confirmed their commitment to work in the field of food production

and quality control. The outcome of our study suggests that delicious meals that are semi-prepared or easily prepared could constitute a preferred type of meal of young population, results similar to findings of other surveys [Costa et al. 2003, Wansink et al. 2003].

Knowledge on MSG and desire to consume food containing additive MSG

Over the last decade consumers have become increasingly concerned by health risks posed by food consumption. To determine whether awareness of consumers about food additives, the questionnaire included questions related to the knowledge on MSG and desire to consume food containing additive MSG. Comparison of the *differences between* responses from group A and group B, *in terms of knowledge on additive MSG* (questions no. 7, 8 in Table 1) it was concluded that the attitudes of these groups differ significantly ($\chi^2 = 14.510$, $p < 0.05$). Those findings confirmed number of YES answers (Table 2), and can be concluded that students from the Faculty of Food Technology and Nutrition (A-group), as result of their education have shown more knowledge about the additive MSG, than other students (B-group). Comparing the level of the total tested population, knowledge of female and male subjects on additive MSG, it was found that there was no a statistically significant difference ($\chi^2 = 1.310$, $p < 0.05$) between subjects (Table 3).

In our study, responses of groups A and B regarding *the desire to consume concentrates of soups, food containing additive MSG or food prepared in microwave oven*, were compared (questions no. 14, 15, 16 in Table 1), and it was concluded that the attitudes of these groups differ significantly ($\chi^2 = 12.499$, $p < 0.05$). Calculating relationship of YES answers between the A and B groups responses (Table 2) showed that students from group A, expecting to have more knowledge about the additives, have shown more awareness in choices of food containing additives and MSG as flavour enhancer, than students from group B. Comparing the level of the total tested population, attitude of female and male subjects in desire to consume food containing flavour enhancer MSG (Table 3), it was found that there was no statistically significant difference between the subjects ($\chi^2 = 3.613$, $p < 0.05$).

The findings of our study are similar to those of Costa et al. [2007] and indicate that the meals composition and quality are associated with the health-related aspects for some consumers. Therefore, negative evaluation of the wholesomeness, nutritional and sensory quality of some meals containing food additives could become a reason to avoid them.

CONCLUSIONS

This study was aimed at survey of undergraduate student's knowledge on food quality, food additives and nutrition impact on food preference. Our findings show that students with fundamental knowledge on the food quality and food additives had more awareness in choices of food they prefer to consume than other students, representatives of average young consumer. Consumers with less knowledge on the food quality, food additives and nutrition are likely to have difficulty in understanding of the additives role and safety use in food processing. Actions on young consumers' education are recommended as contribution to protecting the health, safety, economic and legal interests of consumers and society.

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