

A survey on awareness of consumers about health problems of food additives in packaged foods and their attitude toward consumption of packaged foods: A case study at Jimma University

¹*Legesse A., ¹Muluken A. and ²Getasew, A.

¹Department of Chemistry, College of Natural Sciences, ²Department of Statistics, College of Natural Sciences, Jimma University, Ethiopia

Article history

Received: 16 December 2014

Received in revised form:

8 May 2015

Accepted: 26 June 2015

Abstract

The objective of the study was to assess degree of consumption of packaged foods, awareness of consumers about health problems of food additives, and also their attitudes towards packaged foods. Two hundred seventy nine employees of Jimma University were participated in the study. Data were collected using semi-structured questionnaires, and analyzed using SPSS software (version16). The results showed that 71.68% of the respondents replied that they do not frequently consume/purchase packaged food mainly for price reason. The rest (28.32%) replied that they frequently consume/purchase packaged foods. The results also showed that 64.15% of the respondents are aware of health problems of packaged foods that contain food additives. However, the majority of respondents (70.96%) still want to continue consumption of packaged foods. This indicates that lack of knowledge of consumers about chemical properties of food additives of specific classes and their associated health risks. Thus, awareness raising activities are recommended to consumers to avoid long-term health problems of food additives.

Keywords

Food additives

Jimma University

Food preservatives

Food colorants

Antioxidants

Food flavoring agents

Community-based education

© All Rights Reserved

Introduction

Food additives are substances that are used in the production, processing, treatment, packaging, transportation or storage of food. They are not normally consumed as food in themselves and not normally used as a characteristic ingredient of food. They are intentionally added to food stuffs to improve or maintain the flavor, texture, colour, taste, appearance, control acidity/basicity (leveling), and also to increase shelf-life by preventing microbial attack of pre-packaged foods (David, 1988; Tuoroma, 1994; Tarnavolgyi and Molnar, 2004; Seetaramaiah *et al.*, 2011; Kumar and Srivastava, 2011; Abdulmumeen *et al.*, 2012).

The additives are generally added in small quantities, and considered to be “safe” under the condition of their use. It is justified that maintaining food distribution and transportation would be impossible without the use of food additives in the present rapid urbanization and increasing population (Seetaramaiah *et al.*, 2011). Wroblewska (2009) has recently reported that the use of food additives has increased enormously in the past 30 years, and now it is approximately over 200,000 tonnes per year. The global market is also estimated to be around 30 billion USD (Millstone and Lang, 2008). Reports

also mentioned that nowadays about 75% of the diet of Western world is made up of various processed foods, and also annual consumption of food additives of each person is estimated to be 3.6-4.5 kg on average (Tuoroma, 1994; Wroblewska, 2009).

Reports showed that there are more than 5,000 food additives that have been allowed by the US Food and Drug Administration (FDA) to be used in producing processed foods, and the FDA designates them as ‘generally recognized as safe’ (Gratzer, 2005). They can be artificial or natural, and categorized into different groups. Some of the classes are coloring agents, preservatives, antioxidants, emulsifiers, flavoring agents, sweeteners, enzymes, and nutritive agents (David, 1988; Mephram, 2011).

Current trends showed that increasing technology and consumption of packaged foods in the diets of modern society led to increase in the use and need of food additives (Diehl, 2002). This fact, ultimately, led to serious concern on human health particularly on pregnant women, children and also adults who regularly/frequently consume factory packaged foods containing food additives as some of the additives cause toxic reactions (<http://voices.yahoo.com/types-food-additives-their-side-effects-7734498.html>; Polonio and Peres, 2009; Abdelmigid, 2009; Stevenson, 2010; <http://fooddemocracy.wordpress.com>).

*Corresponding author.

Email: adanelegesse@gmail.com

Tel: +251916395678

com/food-additives-and-their-associated-health-risks;). It has also been reported that certain food additives are genotoxic or have carcinogenic effects (Cohen *et al.*, 1982; Tuorma, 1994; Das and Mukherje, 2004; Mooset *et al.*, 2004; Dance-Barnes *et al.*, 2009; Sifa, 2009; Burgos-Moron *et al.*, 2010; Hassan, 2010). There are also reports that associate certain food additives with hyper activity and neurological disturbances in children (Feingold, 1973; Smith, 1991; Tuoroma, 1994; Bateman *et al.*, 2004; McCann *et al.*, 2007; Wroblewska, 2009; Kumar and Srivastava, 2011; Buka *et al.*, 2011) and cardiac attack (Geha *et al.*, 2000). Some reports also associate that increased levels of nitrates in food with increasing deaths from Alzheimer's, Parkinson's and Type 2 diabetes (Anand and Sati, 2013).

As mentioned above, almost all the food additives currently in use have been found to cause health problems on consumers. This has raised health concerns to consumers and governments. However, regardless of the increasing incidence and range of health problems of additives in packaged foodstuffs, awareness of consumers is not as such significant. This could be attributed to the failures of food processing companies that are not listing (labeling) additives (and also their associated side effects) on the packages to provide information to consumers. It is, therefore, very important to carry out a survey or a study in order to explore the knowledge and perceptions of consumers about food additives (and their problems). To the best of our knowledge, no such studies have been conducted in and around Jimma area (even in Ethiopia). So, this study was initiated to assess (i) the awareness of consumers (of different educational status) about human health problems associated with food additives that are found in commonly used pre-packaged foodstuffs and (ii) packaged food purchasing practices of the study population. The findings would give information about the awareness of consumers in the study area about side effects of food additives, and also their attitudes towards packed foods. The results are also expected to serve as inputs to concerned authorities and/or health professionals in developing food safety strategies as well as to consumers in enabling them to make informed-decisions during shopping of packaged foods from super markets and groceries.

Materials and Methods

Description of the study area

This study was conducted at Jimma University. Jimma University is one of the 33 public Universities in Ethiopia. It is found in Jimma city that is located

Table 1. Demographic data of respondents who participated in the study (n=279)

Gender	Frequency (%)
Male	219 (78.49)
Female	60 (21.50)
Level of education	
12 th grade completed	6 (2.15)
Diploma	22 (7.88)
BSc/BA	103 (36.91)
MA/MSc	86 (30.82)
PhD/MD	40 (14.33)
Others*	22 (7.88)

* Others refer those respondents that have not completed 12th grade level education.

in the south western Ethiopia, and 346 km away from Addis Ababa, the capital of Ethiopia. The University is known for its unique philosophy. i.e., community-based education (CBE) (Mekonnen, 2000). In this program, regardless of their field of study and year of stay in the University, students must go to the surrounding community (up to 50 km radius) around Jimma city. The purpose is to enable students to identify problems of the community and prioritize them. Based on severity of the identified problems, the students make interventions to solve some the problems by mobilizing the community. Currently, the University accommodates more than 30,000 students (at under graduate and post graduate levels) in its one institute and eight colleges comprising of different Departments. The study was conducted from November 2012 to April 2013.

Study population

The study population that participated in the study were employees of Jimma University of different educational status and occupation, particularly those employees who were assumed to be capable to purchase packaged foods and also the ones that frequently purchase those foods.

Data collection and analysis

Data were collected from randomly selected 279 respondents that consisted of 219 (78.49%) males and 60 (21.51%) females. To collect the data, semi-structured questionnaires were prepared in English (Supplementary material I). Then the questionnaires were distributed for self-administration. Those respondents who were willing but not able to attend the questionnaires in English were provided questionnaires that were translated to local language (Amharic). Based on their socio demographic characteristics, the respondents were grouped by sex and educational status (Table 1). Analysis of the collected data was carried out using SPSS software (version 16).

Table 2. Reasons given by respondents for not consuming packed foods (n=279)

S.No	Reason(s) for not using packed foods	Frequency (%)
1	Packed food are expensive than unpacked (raw) or homemade foods	90 (32.26)
2	Low preference by respondents and their family for packed foods purchased from supermarkets	47 (16.85)
3	Packed foods are easily perishable or spoiled	36 (12.90)
4	Other reasons	23 (8.24)
5	Both (2, 3)	4 (1.43)

Results and Discussion

Consumption of packed foods

Today, it is a common practice to consume pre-packaged foods by individuals everywhere in the world. The growing demand of consumers worldwide for healthy and nutritious foods led to use of food additives in new packaging system (Linneman *et al.*, 1999; Tritscher, 2004). This, in turn, has led to growing concerns among consumers about their health as chemical food additives that have been found to cause human health problems (Sohár and Domoki, 1997). The present study was carried out in order to assess the degree of consumption of packaged foods by the community in the study area. The results indicated that out of 279 respondents, 200 (71.68%) replied that they do not frequently consume/purchase packaged foods whereas the rest (79, 28.32%) of the respondents said that they frequently purchase/consume packaged foods from supermarkets and/or shops. Different reasons were given by both groups of respondents. The reasons given by those respondents who said that they do not consume packaged foods frequently are (i) packed foods are expensive than unpacked or raw food stuffs (90, 32.26%), (ii) low preference of the respondents and their family to the products (47, 16.85%), (iii) packaged foods are easily perishable (36, 12.90%), and other reasons such as unavailability (23, 8.24%), and very low respondents also said both low preference and easily perishability (4, 1.43%) as possible reason for not consuming or purchasing packaged foods (Table 2).

The respondents who said that they frequently consume packaged foods gave the following reasons. The reasons are the products are easy to manage (42, 15.05%), rich in nutrients (35, 12.55%), cheaper than unpacked foods (8, 2.87%) and all the above reasons (4, 1.43%) (Table 3). As the result indicates, packaged foods are easy to manage, though they are not cheap, by the people of modern life style and hectic time schedules. This result is consistent with the report of Caballero *et al.* (2003) that showed addition of

Table 3. Reasons given by respondents who frequently consume packaged foods (n= 279)

S.No	Reasons for consuming packed foods	Frequency (%)
1	Packed foods are easier to mange	42 (15.50)
2	Packed foods are rich in nutrients	35 (12.55)
3	Packed foods are cheaper than unpacked foods	8 (2.87)
4	All	4 (1.43)

additives to foods to have a major benefit as their addition offer advantages to find foods on market with lower prices, better organoleptic properties of food as well as extending their shelf life for consumers of modern society.

Among the packaged food items that are consumed by those respondents who said they frequently consume packaged foods are packed fruit juices and powders (27, 9.86 %), biscuits and related products (24, 8.60%), packed milk (16, 5.73%) and others (15, 5.40%) and all (3, 1.08%) (Table 4). It is important to note that though the data collected from respondents indicated that majority of respondents do not consume packaged foods, our visit to supermarkets and shops practically showed that majority of people in the study area consume (or purchase) packed foods. This suggests that the respondents might either not have given genuine responses or they misunderstood the meaning of packaged foods. Therefore, further surveys are required in the future.

Assessment of awareness of consumers about health risks of chemical additives in packaged foods

As discussed in the introduction section, different types of chemical additives (flavoring agents, coloring agents, antioxidants, preservative and sweeteners) are added to packaged foods for several reasons. However, these additives became one of the most important food safety issues as they cause human health problems (Boga and Binokay, 2010). In this study, the survey was carried out in order to assess knowledge/awareness of the respondents about chemicals that are added to packaged foods, and also their awareness about human health problems of regular consumption of packaged foods containing chemical additives. Thus, the respondents were requested about health effect of food additives in packaged foods. The data (responses) indicated that the majority of the respondents (179, 64.15%) said that they are aware of human health problems associated with the consumption of packaged foods containing food additives whereas the rest 100 (35.64.15%) said that consuming such foods has no effect on human health. These results are not consistent with previous survey reports by Shim *et*

Table 4. Responses of participants about the types of packaged foods that are frequently purchased for consumption (n= 279)

S.No	packed foods frequently consumed by respondents	Frequency (%)
1	Packed fruit juices and powders	27 (9.86)
2	Biscuits and related products	24 (8.6)
3	Packed milk products	16 (5.73)
4	Others	15 (5.40)
5	All	3 (1.08)

al. (2011) who showed that among 430 respondents (from Soul, Korea), two-thirds of respondents have lack of information about food additives.

The reasons given by those respondents who frequently consume packaged foods and saying there are no human health problems as a result of consumption of such foods are (i) the products prepared carefully (69,24.73%) and (ii) lack of information (have not heard) about health problems of these products (24, 8.6%) (Table 5). Some of the respondents (7, 2.5%) also mentioned that packed foods are prepared carefully, haven't heard, and other as possible reasons to claim that packaged foods cause no health problems. On the other hand, the respondents who said that consuming packaged foods cause human health problems mentioned some health problems. These are cardiac problems, intestinal problems, children health problems, lung problems and allergic reactions (Data not given). This observation is consistent with literature reports that claim food additives and preservatives in packaged foods can cause several human health problems such as hormone disturbance, obesity, cancer, allergic reactions, fertility problems and hyper activity (Williams *et al.*, 2004). The data in the present survey suggests that consumers should be aware about health problems of regular consumption of packaged foods as almost all industrially packed foodstuffs contain different types of food additives.

Attitude consumers toward packaged foods

The final item in our survey questionnaire was used in order to assess attitude of the respondents towards packed foods. It was requesting the respondents to give their overall opinion in two regards. It was about consumers' opinion whether to keep on consuming packaged foods or to stop consuming these products. The results (data) indicated that many of the respondents (198, 70.96%) are in favor of consuming packaged foods but in restricted quantities where as some of the respondents (48, 17.20%) are in favor of continuing in consuming packaged food stuffs, and few of them (33,11.82%) said we should avoid

Table 5. Reasons given by respondents who claimed that consuming packaged foods has no human health problems (n=279)

S.No	Reasons	Frequency (%)
1	Packed foods are prepared carefully	69(24.73)
2	No information (haven't heard) about health problems of food additives in packed foods	24 (8.60)
3	Others	7(2.50)

consuming these foods.

The data obtained from the present study indicated that the majority of the respondents seem to have awareness about health problems of frequent consumption of packaged foods. However, awareness by itself is not a sufficient condition unless consumers tried to avoid consumption of such foods. The responses from the participants of the study showed that they still want to continue in their practice of purchasing and consuming packaged foods.

This could be attributed to lack of knowledge about health implications of specific classes of additives such as colorants, preservatives, flavoring agents, antioxidants and sweeteners. This observation is consistent with previous reports that showed the majority of consumers in many countries have no or little knowledge about incidence and work of food additives (Altu and Elmaci, 1995; Shimet *et al.*, 2011; Kozelova *et al.*, 2012). These facts suggest a need for educating consumers about benefits, functions and health risks of chemical additives in packaged foods so that consumers can make informed decision during their shopping or change their shopping practices that include checking additives contents (or compositions) and/or avoid such foods completely (if possible). Nowadays, media plays significant roles in many aspects of human daily life. Therefore, media (in electronic or printed form) can be used in disseminating information among consumers regarding health risks of food additives in prepackaged food items. Experiences also showed that media can change consumers' shopping and eating habits as result of awareness created (by media) about potential health dangers of food additives (Miller, 1983; Tarnavolgyi and Molnar, 2004).

Conclusions

The results of the study showed that the majority of the respondents replied that they do not frequently consume (purchase) packaged foodstuffs, and also are aware of health problems of frequent consumption of packaged foods. However, the majority of the respondents are in favor of continuation of consuming packaged foodstuffs from super markets.

Moreover, our observation in super market showed that the purchasing practices of the study population is completely in contrast to what has been replied to questionnaires. This could be attributed to lack knowledge of consumers about details of health risks associated to specific class of food additives. Therefore, there is a need to carry out long term campaign to change consumers' consumption patterns of packaged foods in order to reduce health risks of chemical additives in those foods.

The current study was not comprehensive as it was carried out to a limited number of consumers from Jimma University who were thought to purchase packaged foods frequently. Thus, further surveys that include participants from other residents of Jimma city and surrounding rural areas is recommended to get informative data about degree of consumption of packaged foods, awareness of consumers about health problems of frequent consumption of packaged foods as well as to determine attitude of the general public of the study area toward packaged foods. This would help concerned authorities and health professional to design a strategy in order to reduce health risks of packaged foods (or their chemical additives) on consumers.

Acknowledgement

The authors thankfully acknowledge Jimma University for financial support.

References

- Abdelmigid, H.M. 2009. Risk assessment of food coloring agents on DNA damage using RAPD markers. *The Open Biotechnology Journal* 3: 96-102.
- Abdulmumeen, H.A., Risikat, A.N. and Sururah, A.R. 2012. Food: Its preservatives, additives and applications. *International Journal of Chemical and Biochemical Sciences* 1: 36-47.
- Altu, T. and Elmaci, Y. 1995. A consumer survey on food additives. In: *Developments in Food Science*. 37: 705-719.
- Anand, S.P. and Sati, N. 2013. Artificial preservatives and their harmful effects: looking toward nature for safer alternatives. *International Journal of Pharmaceutical Sciences and Research* 4: 2496-2501.
- Bateman, B., Warner, J., Hutchinson, E., Dean, T., Rowlandson, P., Gant, C., Grundy, J., Fitzgerald, C. and Stevenson, J. 2004. The effects of a double blind, placebo controlled, artificial food colourings and benzoate preservative challenge on hyperactivity in a general population sample of preschool children. *Archives Disease Childhood* 89:506-511.
- Boga, T. and Binokay, S. 2010. Food additives and effects to human health. *Archives Medical Review Journal* 19: 141-154.
- Buka, I., Osornio-Vargas, A. and Clark, B. 2011. Food additives, essential nutrients and neurodevelopmental behavioural disorders in children: A brief review. *Paediatrics and Child Health* 16: 54-56.
- Burgos-Moron, E., Calderon-Montano, J. M., Salvador, J., Robles, A. and Lopez-Lazaro, M. 2010. The dark side of curcumin. *International Journal of Cancer* 126: 1771-1775.
- Caballero, B., Trugo, L. and Finglas, P. 2003: *Encyclopedia of Food Sciences and Nutrition*. p. 2581-2586.
- Cohen, S.M., Murasaki, G., Fukushima, S. and Greenfield, R. E. 1982. Effect of Regenerative Hyperplasia on the Urinary Bladder: Carcinogenicity of Sodium Saccharin and N-[4-(5-Nitro-2-furyl)-2-thiazolyl] formamide. *Cancer Research* 42: 65-71.
- Dance-Barnes, S.T., Kock, N.D., Moore, J.E.; Lin, E.Y. and Mosley, L.J. 2009. Lung tumor promotion by curcumin. *Carcinogenesis* 30:1016-1023.
- Das, A. and Mukherjee, A. 2004. Genotoxicity testing of the food colours amaranth and tartrazine. *International Journal of Human Genetics* 4: 277-280.
- David, T. J. 1988. Food additives. *Archives Disease Childhood*. 63: 582-583.
- Diehl, J.F. 2002. Some established facts and some new concepts in food toxicology - A review. *Acta Alimentaria* 31: 355-369.
- Feingold, B.F. 1973. Food additives and child development. *Hospital Practice* 21: 11-12.
- Geha, R.S., Beiser, A., Ren, C., Patterson, R., Greenberger, P.A., Grammer, L.C., Ditto, A.M., Harris, K.E., Shaughnessy, M.A., Yarnold, P.R., Corren, J. and Saxon, A. 2000. Review of alleged reaction to monosodium glutamate and outcome of a multicenter double-blind placebo-controlled study. *Journal of Nutrition* 130 (Suppl. 45): 1058S-1062S.
- Gratzer, W. 2005. *Terrors of the Table*. Oxford: Oxford University Press, pp213-221.
- Hassan, G.M. 2010. Effects of some synthetic coloring additives on DNA damage and chromosom alaberrations of rats. *Arab Journal of Biotechnology* 13: 13-24.
- Internet: Food additives and their associated health risks. Downloaded from <http://www.fooddemocracy.wordpress.com> on 01/24/2014.
- Internet: Types of food additives and their side effects. Downloaded from <http://voices.yahoo.com/types-food-additives-their-side-effects-7734498.html> on 01/24/2014.
- Kozelova, D., Fikselova, M., Dodokova, S., Mura, L., Mendelova, A. and Vietoris, V. 2012. Analysis of consumer preferences focused on food additives. *Acta Universitatis Agricolurae Et Silviculturae Mendelianae Brunensis* 60:197-204.
- Kumar, G. and Srivastava, N. 2011. Genotoxic effects of two commonly used food additives of boric acid and sunset yellow in root meristems of *Trigonella foenum-graecum*. *Iranian Journal of Environmental Health Science and Engineering* 8: 361-366.
- Linneman, A.R., Meerdink, G., Meulenberg, M.T. and

- Jongen, W.M. 1999. Consumer-oriented technology development. *Trends in Food Science and Technology* 9: 409-414.
- McCann, D., Barrett, A., Cooper, A., Crumpler, D., Dalen, L. and Grimshaw, K. 2007. Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial. *The Lancet* 370: 1560-1567.
- Mekonnen, A. 2000. Community-based education: Concept and practice. *Ethiopian Journal Health Development* 14: 227-237.
- Mephram, B. 2011. Food additives: an ethical evaluation. *British Medical Bulletin* 99: 1-17.
- Miller, M.E., Lummus, Z.L. and Bernstein, D.I. 1996. Occupational asthma caused by FD & C blue dye no. 2. *Allergy Asthma Proceeding* 17: 31-34.
- Millstone, E. and Lang, T. 2008. Food additives. In: *The Atlas of Food*, 2nd edn. London: Earthscan, pp90-91.
- Moos, P.J., Edes, K., Mullally, J.E. and Fitzpatrick, F.A. 2004. Curcumin impairs tumor suppressor p53 function in colon cancer cells". *Carcinogenesis* 25: 1611-1617.
- Polonio, M.L. and Peres, F. 2009. Food additive intake and health effects: public health challenges in Brazil. *Cad Saude Publica* 25: 1653-1666.
- Seetaramaiah, K., Smith, A.A., Murali, R. and Manava, R. 2011. Preservatives in food products- Review. *International Journal of Pharmaceutical and Biological Archives* 2: 583-599.
- Shim, S., Sheo, S., Lee, Y., Moon, G., Kim, M. and Park, J. 2011. Consumers' knowledge and safety perceptions of food additives: Evaluation on the effectiveness of transmitting information on preservatives. *Food Control* 22: 1054-1060.
- Sifa, T. 2009. Genotoxic effects of mono-, di-, and trisodium phosphate on mitotic activity, DNA content, and nuclear volume in *Allium cepa* L. *Caryologia* 62: 171-179.
- Smith, J. M. 1991. Adverse reactions to food and drug additives. *European Journal of Clinical Nutrition* 45: 17-21.
- Stevenson, J. 2010. Recent research on food additives: Implications for CAMH. *Child Adolescent Mental Health* 15: 130-133.
- Tarnavolgyi, G. and Molnar, E. 2004. Attitudes toward food additives in Hungarian consumers - preliminary results. *Acta Agriculturae Slovenica, Supplement* 1: 113-120.
- Tritscher, M.A. 2004: Human health risk assessment of processing-related compounds in food. *Toxicology Letters* 149:177-186
- Tuormaa, T. E. 1994. The adverse effects of food additives on health: A review of the literature with special emphasis on childhood hyperactivity. *Journal Orthomolecular Medicine* 9:2 25-243.
- Williams, P., Stirling, E. and Keynes, N. 2004. Food fears: a national survey on the attitudes of Australian adults about the safety and quality of food. *Asia Pacific Journal of Clinical Nutrition* 13: 32-39.
- Wroblewska, B. 2009. Influence of food additives and contaminants (nickel and chromium) on hypersensitivity and other adverse health reactions - A review. *Polish Journal of Food Nutrition Science* 59: 287-294.