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Knowledge and Attitudes of Dietitians Concerning Seafood Consumption and Processing/ Preservation Technologies

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Abstract

Abstract

This survey was carried out to measure the knowledge and attitudes of dietitians regarding seafood consumption and common processing/preservation technologies. It was also aimed to compare knowledge of dietitians with the other respondents, educated in other sciences. Eighty-five of the respondents were educated in nutrition science (dietitian) and 221 in other sciences (non-dietitian=ND). Opinions of the respondents were generally dependent of being a dietitian ($p<0.05$). Dietitians were generally against or not recommending the consumption of mussels, lakerda, salted and smoked seafood, while non- dietitians more prone to their consumption. On the other hand, dietitians had a more positive approach to the consumption of canned and frozen seafood, fish oil, surimi, sous-vide and MAP-packed seafood, spirulina, and aquaculture fish than the NDs. It was seen that, most of the processed seafoods are not known by the substantial part of the respondents. Receiving high percentages of the answer “I don’t know what it is” from the dietitians was remarkable, and indicated their ignorance.

As a result, the need of dietitian education on seafood products and common processing/preservation technologies was determined. Since dietitians guide consumer preferences, their education may help to achieve a better guided consumer and to improve market recognition of seafood.

Keywords: Anket, gıda tüketim sıklığı; balık tüketimi, diyet.

Diyetisyenlerin Su Ürünlerinin Tüketimi ve İşleme/Muhafaza Yöntemleri Konusundaki Yaklaşımları ve Bilgi Düzeyleri

Özet

Bu anket çalışması diyetisyenlerin su ürünleri tüketimi ve yaygın kullanılan işleme /muhafaza teknolojileri hakkındaki bilgi ve yaklaşımlarını değerlendirmek üzere yapılmıştır. Diyetisyenlerin bilgi düzeyinin başka bilim dallarında eğitilmiş kişilerle karşılaştırılması da amaçlanmıştır. Ankete katılanların 85’i beslenme alanında (diyetisyen); 221’i ise diğer alanlarda eğitilmiş (diyetisyen olmayan=ND) kişilerdir. Anket katılımcılarının fikirleri genellikle diyetisyen olmalarına bağlı bulunmuştur ($P<0.05$). Diyetisyenler genellikle midye, lakerda, tuzlanmış ve dumanlanmış su ürünlerinin tüketilmesine karşıyken, diyetisyen olmayanlar bunların tüketilmesi konusunda daha açık görüşlüdür. Diğer yandan, diyetisyenler konserve ve donmuş su ürünleri, balık yağı, surimi, sous-vide ve MAP paketlenmiş su ürünleri, spirulina ve çiftlik balığı tüketimine ND’lerden daha olumlu yaklaşmışlardır. İşlenmiş su ürünlerinin çoğunun anket katılımcılarının önemli bir kısmı tarafından bilinmediği görülmüştür. Diyetisyenlerden büyük oranda “Bunun ne olduğunu bilmiyorum” cevabının alınması dikkat çekici olup, onların bu konudaki bilgi yetersizliğini göstermektedir.

Sonuç olarak, diyetisyenlerin su ürünleri ve yaygın olarak kullanılan işleme/muhafaza teknolojileri konusunda eğitilmelerinin gerekliliği tespit edilmiştir. Diyetisyenler tüketici tercihlerini yönlendirdiklerinden, onların eğitilmesi tüketicinin daha iyi yönlendirilmesi ve su ürünleri pazarında farkındalığın artırılması açısından yararlı olacaktır

Anahtar Kelimeler: Anket, gıda tüketim sıklığı; balık tüketimi, diyet.

Introduction

Seafoods are of great importance for human nutrition, since they are important sources of protein,

essential amino acids, fatty acids, retinol, vitamin D, vitamin E, and minerals such as iodine and selenium (Schaafsma, 2008). However, despite this healthy image, people find themselves confused about

seafood consumption due to the variety of different information ranging from newspaper, through public authorities, newscast etc., even they are well-educated consumers (Wang *et al.*, 2009). Therefore, monitoring their knowledge is important to correct possible misinformation, to generate better communication instruments, and to achieve a better informed consumer.

Dietitians are the food and nutrition experts. They advise people on what to eat or not to maintain a healthy life, and lead consumers' preferences (Mitchell *et al.*, 2012). Since dietitians are the experts in nutrition, their knowledge level about food and seafood must be higher than any person, graduated from other professions. However, some of them may not be familiar with various seafood products and common processing/preservation technologies. As dietitians' statements are important for the society, dietitians must be able to provide current knowledge about foods and changes in food technology (Howard *et al.*, 1999). So, monitoring their knowledge and attitudes is very important (Wie *et al.*, 1998). Dietitian's knowledge and perceptions regarding vegetarian diets (Duncan and Bergman, 1999); meat (Holdt *et al.*, 1993); dietary supplements (Cashman *et al.*, 2003; Hetherwick *et al.*, 2006; Lederman *et al.*, 2009), w-3 fatty acids (Spellman *et al.*, 2008), functional foods (Lee *et al.*, 2000; Marset *et al.*, 2012; Monahan-Couch and Harris 2008); whole grain foods (Chase *et al.*, 2003), olestra (Krisa-Kurey and Levine, 1999), genetically engineered and irradiated foods (Wie *et al.*, 1998) have been studied.

Due to the contradictory news, seafood consumption is usually a confusing subject for many consumers, and it is also very common for dietitians to answer the client questions regarding the consumption of raw or processed seafood. However, research on dietitians' responds is very limited. Since dietitians play an important role to instruct consumers with science-based information, a better understanding of their knowledge on seafood, especially processed/preserved, may be helpful to develop effective tools of communication and to achieve a better informed consumer (Hetherwick *et al.*, 2006).

This survey was carried out to determine the knowledge level of dietitians regarding seafood consumption and common processing/preservation technologies, and to compare with the other respondents, educated in other sciences (non-dietitians=ND). Regarding the importance of dietitian education (Box *et al.*, 2001; Cashman *et al.*, 2003; Hetherwick *et al.*, 2006; Lee *et al.*, 2000), results of this survey may provide to create better tools of communication, and can be used for the dietitian education programs. Our findings may also help the industry and academia to develop better messages on seafood consumption and common processing/preservation technologies; therefore achieving a better informed consumer may be

possible.

Methods

A 23-question survey, regarding the seafood consumption and common processing /preservation technologies was prepared. First of all, the gender, age and education of the respondents were asked. Then the first question "What is your opinion about the statement *seafood consumption is healthy and needed?*" was asked. The questions 2-17 were "what is your opinion about the consumption each of mussels - crustaceans - fatty fish- lean fish - canned seafood - frozen seafood - fish oil and capsules - spirulina - w3 reached foods chitosan - aquaculture fish - irradiated foods- modified atmosphere packaged seafood - sous vide packaged seafood- food additive included seafood - MSG added food?". The questions between 18-23 were "what is your opinion about the consumption each of processed seafood such as smoked - surimi - lakerda - dried fish - salted fish - marinated?". Since the aim was to determine and compare the knowledge level of dietitians with the other respondents, educated in other sciences (non-dietitians = NDs), survey forms were e-mailed both to dietitians and NDs. A random sample of 180 Turkish Dietitians was chosen from the Turkey Dietetic Association membership list. As to NDs, questionnaires were e-mailed to randomly chosen 500 individuals, educated in other sciences. Returned surveys were examined, unreliable responses were eliminated. Therefore, reliable responses of 85 dietitians and 221 non-dietitians were evaluated to obtain results. Reliable response ratios were 44.2% for the non-dietitians and 47.22% for the dietitians.

The first question was about their opinions on the statement of "seafood consumption is healthy and needed". Then, their opinions about the consumption of mussel, crustaceans, fatty fish, lean fish, canned seafood, frozen seafood, fish oils, Spirulina, w-3 reached foods, chitosan, aquaculture fish, irradiated seafood, modified atmosphere packed seafood, sous vide packed seafood, food additive included seafood, MSG added seafood, smoked fish, surimi, lakerda, dried fish, salted fish and marinated fish were questioned. Respondents were also asked whether they know mentioned seafood and processing/preservation techniques or not.

Raosoft Sample Size Calculator was used to calculate the need sample sizes with margin of error 5%, the confidence level 95% (<http://www.raosoft.com/samplesize.html>). The responses were gathered in Microsoft Excel Office Program 2007 version. The responses were coded, i.e. 1 for dietitians, 2 for NDs. Data quality was examined relevant to missing or incorrect data. After the organization and visualization the data, descriptive statistics and frequencies were compared using NSCC (2007) statistical software. In order to see if the knowledge or attitude regarding seafood consumption

and common processing/preservation technologies is independent of being dietitian or ND, Chi Square independence tests were used.

Results and Discussion

Seafood Consumption

First of all, the respondents were asked to indicate their attitudes about seafood consumption (Table 1). The opinions of the respondents on the statement “Seafood consumption is healthy and needed” were asked, and the opinions were found to be dependent of being a nutrition specialist ($P < 0.05$). Surprisingly, 10.59% of the dietitians and 7.69% of

the NDs’ strongly disagreed with that statement. Most of the dietitians (76.47%) were strongly agree with the healthiness of seafood consumption, and this percentage was 61.09% for the NDs. These results confirm the image of fish as a safe, healthy and nutritious food (Schaafsma, 2008).

Mussel Consumption

When the opinions of the respondents on the mussel consumption was examined (Table 2), the most common respond was “it may be consumed limitedly” (dietitians, 44.71% and NDs, 39.82%). Many dietitians (42.35%) were against its consumption, while this rate was only 21.27% for the

Table 1. The responses to the statement “seafood consumption is healthy and needed

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	Probability
Dietitian	10.59	1.18	0	11.76	76.47	0.016605
ND*	7.69	0.45	0.45	30.32	61.09	Reject H0

*ND: Not Dietitian

Table 2. The respondent’s opinions about the consumption of seafoods and the use of common technologies

		Didn’t Hear About It	Against Consumption	Not Sure	May Be Consumed Limitedly	Suggesting Consumption	Must Be Consumed	Probability
Mussel	Dietitian	0	42.35	4.71	44.71	8.24	0	0.000034
	ND*	0	21.27	20.36	39.82	12.67	5.88	Reject H0
Crustacean	Dietitian	0	17.65	11.76	54.12	16.47	0	0.001598
	ND	0	9.50	20.81	39.37	21.72	8.60	Reject H0
Fatty fish	Dietitian	0	0	1.18	15.29	48.24	35.29	0.636490
	ND	0	0.90	2.26	18.55	40.27	38.01	Accept H0
Lean fish	Dietitian	0	1.18	3.53	7.06	64.71	23.53	0.064685
	ND	0	1.36	4.98	14.03	46.15	33.48	Accept H0
Canned seafood	Dietitian	0	10.59	8.24	45.88	31.76	3.53	0.000200
	ND	0	19.00	23.08	40.27	13.12	4.52	Reject H0
Frozen seafood	Dietitian	0	7.06	7.06	29.41	51.76	4.71	0.000000
	ND	0	20.81	26.70	33.03	16.29	3.17	Reject H0
Fish oils and capsules	Dietitian	0	10.59	8.24	34.12	40.00	7.06	0.000010
	ND	0	14.93	32.58	28.05	17.65	6.79	Reject H0
Spirulina	Dietitian	16.47	17.65	3.53	3.53	0	58.82	0.000000
	ND	43.89	24.89	6.33	4.52	0	20.36	Reject H0
w-3 reached foods	Dietitian	10.59	9.41	18.82	58.82	0	2.35	0.000004
	ND	36.20	12.67	19.00	27.15	0.45	4.52	Reject H0
Chitosan	Dietitian	60.00	15.29	7.06	12.94	4.71	0	0.000000
	ND	90.95	1.36	3.17	2.71	1.36	0.45	Reject H0
Aquaculture fish	Dietitian	0	2.35	11.76	28.24	55.29	2.35	0.002056
	ND	0	12.22	13.57	33.48	33.48	7.24	Reject H0
Irradiated seafoods	Dietitian	49.41	11.76	17.65	12.94	8.24	0	0.000126
	ND	73.76	12.22	5.43	5.43	2.71	0.45	Reject H0
Modified atmosphere packed seafoods	Dietitian	50.59	3.53	11.76	11.76	21.18	1.18	0.000951
	ND	67.42	8.60	11.31	4.07	7.69	0.90	Reject H0
Sous-vide packed seafoods	Dietitian	55.29	4.71	8.24	5.88	23.53	2.35	0.000000
	ND	85.97	1.81	7.69	1.81	2.26	0.45	Reject H0
Food additive included seafoods	Dietitian	0	40.00	3.53	47.06	7.06	2.35	0.000000
	ND	0	66.97	12.22	16.29	0.45	4.07	Reject H0
MSG added seafoods	Dietitian	1.18	40.00	3.53	45.88	7.06	2.35	0.000000
	ND	0	68.78	9.05	17.19	0.90	4.07	Reject H0

ND*= Non-dietitian

NDs. It seems that, dietitians are quite against mussel consumption ($P<0.05$).

Crustacean Consumption

As to crustaceans; such as shrimps, crabs and lobsters dietitians (54.12%) and NDs (39.37%) mostly preferred a limited consumption. The sum of the positive declarations, "I am suggesting its consumption" and "it must be consumed" was 30.32% for NDs. However, none of the dietitians declared the statement "it must be consumed" for the crustaceans and only 16.47% of them suggested their consumption. On the other hand, the remarkable part of the dietitians (17.65%) were against crustacean consumption. Therefore, NDs were found to be more prone to consume crustaceans ($P<0.05$).

Fatty and Lean Fish Consumption

The consumption of fatty/lean fresh fish was generally advised by the dietitians (Table 2). According to Holdt *et al.* (1993) dietitians decreased their own consumption of pork, eggs, beef, and cheese, but increased chicken and fish consumption, during the past 3-5 years. On the other hand, there was no significant difference between the responses of dietitians and NDs ($P>0.05$). It was seen that, the consumption of fresh fish was generally supported and considered as safe.

Canned Seafood Consumption

Canned fish is one of the most preferred processed fish products (Brunsi *et al.*, 2008; Erdogan *et al.* 2011). However, the common opinion of the respondents was to consume canned seafood limitedly in this study. Nineteen percent of NDs were against its consumption, while this percentage was 10.59% for the dietitians. A remarkable part of the dietitians (31.76%) suggested the consumption of canned seafood. It was concluded that, being a nutrition specialist positively affected ($P<0.05$) the opinions about canned seafood consumption.

Frozen Seafood Consumption

As it may be seen in Table 2, consumption of the frozen seafood was generally suggested by the dietitians (51.76%). Likewise, consumers prefer deep-frozen fish, with respect to processed fish products in Belgium and the Netherlands (Brunsi *et al.*, 2008). On the other hand, most of the NDs (33.03%) stated that frozen seafood may be consumed limitedly, 26.70% of them were not sure; and a considerably high percent (20.81%) was against the consumption; in our study. It was concluded that, NDs were predominantly opposite to frozen seafood consumption, by contrast with the dietitians. This result shows that education in nutrition science

positively affected the respondents opinions ($P<0.05$).

Fish Oil and Capsule Consumption

Lederman *et al.* (2009) reported that, dietitians require additional education on the use of dietary supplements, since they are not well equipped with knowledge in this area. However, fish oils and capsules were generally suggested by the dietitians (40.00%), while the NDs were generally not sure about their consumption (32.58%), in the present study. There was a significant difference between the responses of dietitians and NDs ($P<0.05$). It might be concluded that, education in nutrition science positively affected the dietitians' opinions. Dickinson *et al.* (2012) declared that, most of the dietitians prefer to use dietary supplements as a part of a healthy diet, and recommend to their clients. Dietitians expressed the top three reasons for using dietary supplements as bone health, overall wellness, and and to fill nutrient gaps.

Spirulina Consumption

Spirulina is a microalgae, rich in protein and other essential nutrients. Antioxidant activity of *Spirulina* has also been known (Miranda *et al.*, 1998); and health benefits such as the inhibition of HIV-1 (Ayeahunie *et al.*, 1998), rehabilitation of vitamin A deficiency (Seshadri, 1993), healing of malnutrition (Ren, 1987) have been reported in the literature. It is also known as a natural sorbent of radionucleides (Loseva and Dardynskaya, 1993). In this study, majority of dietitians (58.82%) supported *Spirulina* consumption. However, 16.47% of the dietitians and 43.89% of the NDs ($P<0.05$) had no idea about it. It was concluded that, a public education about *Spirulina* is needed.

W-3 Reached Food Consumption

Non-dietitians mostly (36.20%) had no idea about w-3 reached food, and this percentage was only 10.59% for the dietitians ($P<0.05$). As a result of a survey, conducted by Spellman *et al.* (2008), almost all respondent dietitians (99%) regarded omega-3 fatty acids as important factors for health, and offered omega-3 containing foods. In another survey, the majority (84%) of the dietitians had a positive attitude about functional foods (Monahan-Couch and Harris, 2008). It was expressed that, increasing w-3 fatty acids intake improve cardiovascular health and provide other health benefits (Harris *et al.*, 2009). However, the dietitians (58.82%) and NDs (27.15%) mostly suggested a limited consumption, in our study. More informative is needed for a better understanding of w-3 reached foods. Likewise, Lee *et al.* (2000) specified the need of dietitian training on the use of functional foods.

Chitosan Consumption

Most of the dietitians (60.00%) but almost all of the NDs (90.95%) did not recognize chitosan ($P<0.05$). The informed dietitians were generally (15.29%) against its consumption. However, many health benefits of chitosan have been reported in the literature. It reduces body weight, hypercholesterolemia, and hypertension (Guerciolini *et al.*, 2001). It may reduce systolic and diastolic blood pressure; and has anti-ulcer, anti-arthritic, anti-uricemic properties (Shahidi and Abuzaytoun, 2005). Our result underlines the need of the education about chitosan.

Aquaculture Fish Consumption

It was seen that, aquaculture fish is well known by all respondents. Most of the dietitians (55.29%) and 33.48% of the NDs suggested its consumption. On the other hand, 12.22% of NDs were against the consumption of aquaculture fish, while this percentage was only 2.35% for the dietitians. It shows that dietitians supporting aquaculture fish consumption more than NDs ($P<0.05$). While wholesomeness of farmed fish has been declared in the literature (Brunsù, 2003; Gross, 2003; Pieniak *et al.*, 2004), they may have been portrayed in the media as negative images.

Irradiated Seafood Consumption

As to irradiation, most of the NDs (73.76%) and almost half of the dietitians (49.41%) were unfamiliar ($P<0.05$) with irradiated seafood. The familiar dietitians were generally (17.65%) not sure about their consumption. Consumer awareness and acceptance of irradiated foods in Turkey were investigated by Gunes and Tekin (2006). They reported that awareness of the irradiated foods is very low, and the majority of consumers (80%) are uncertain about the safety of irradiated foods. They highlighted the importance of education to improve market success of irradiated foods. Similar results were obtained in our study.

Modified Atmosphere Packaged (MAP) Seafood Consumption

In the present study, most of the respondents (50.59% of the dietitians and 67.42% of the NDs), were unfamiliar with Modified Atmosphere Technology (MAP). However, MAP has been regarded as one of the most suitable packaging technologies for fish (Reddy and Armstrong, 1992; Stammen *et al.*, 1990), and it has been used around the world to extend shelf life. Since they are the experts on food, and play an important role to instruct consumers on nutrition; it is very important to inform dietitians about this technology. Dietitians, who were

aware of this technology, generally suggested (21.18%) the consumption of modified atmosphere packed seafood. It was determined that, the opinions of the respondents were dependent of being a nutrition specialist ($P<0.05$), and education in dietetics positively affected the opinions of respondents with respect to the use of MAP technology.

Sous-Vide Packaged Seafood Consumption

Sous-vide technology is the cooking of vacuum-packed raw materials under controlled conditions of temperature and time (Schellekens and Martens, 1992). While this technology was not widely known until the mid-2000s; a huge increase occurred in its use after the late-2000s and early-2010s (Baldwin, 2012). In this study, even the percentage of unaware dietitians was significantly lower ($P<0.05$) than that of the NDs (85.97%), more than half of the dietitians (55.29%) had no idea about sous vide technology. On the other hand, 23.53% of the dietitians, familiar with this technology, suggested the consumption of sous vide seafood. It is clear that industry and academia have to inform dietitians and common public about sous-vide seafood.

Food Additives and MSG Added Seafood Consumption

It was determined that, NDs were mostly against the consumption of food additives and MSG included seafood, but dietitians generally advised a limited consumption (Table 2). Therefore, NDs were found to be more hesitant to consume MSG and additive-added seafood ($P<0.05$). These results showed that, advantages and risks of food additives and MSG must be correctly expressed to provide a conscious consumption. In a similar study, conducted on the consumer's knowledge and opinions on food additives, most of the respondents had no idea about food additives. Therefore, necessity of education on the use of food additives has been emphasized (Altun and Elmaci, 1995).

Smoked Fish Consumption

Most of the dietitians (47.06%) were against, but 35.29% of the NDs were suggesting smoked seafood consumption (Table 3). This result shows that dietitians were generally disapproving to consume smoked seafood, while an important part of the NDs recommending ($P<0.05$). Smoked fish may contain pathogenic microorganism (Heinitz and Johnson, 1998), such as *Listeria monocytogenes*, and there may be a positive association between smoked food intake and gastric cancer risk (Jakszyn and González, 2006). Education is needed about the risks of smoked fish consumption.

Table 3. The respondent's opinions about the consumption of processed seafoods

		Didn't Hear About It	Against Consumption	Not Sure	Suggesting Consumption	Probability
Smoked fish	Dietitian	10.59	47.06	30.59	11.76	0.000000
	ND*	14.03	14.48	36.20	35.29	Reject H0
Surimi	Dietitian	77.65	3.53	7.06	11.76	0.039164
	ND	81.45	3.17	11.76	3.62	Reject H0
Lakerda	Dietitian	30.59	15.29	31.76	22.35	0.000026
	ND	23.98	6.33	18.10	51.58	Reject H0
Dried fish	Dietitian	12.94	16.47	29.41	41.18	0.412936
	ND	14.48	9.95	35.84	40.72	Accept H0
Salted fish	Dietitian	18.82	35.29	27.06	18.82	0.000000
	ND	11.31	10.86	37.56	40.27	Reject H0
Marinated fish	Dietitian	54.12	3.53	15.29	27.06	0.014567
	ND	72.40	1.36	11.76	14.48	Reject H0

ND*= Non-dietitian

Surimi Consumption

In this study, the vast majority of the respondents (77.65% of the dietitians and 81.45% of the NDs) were unfamiliar with surimi. Most of the aware dietitians suggested its consumption (11.76%); but aware NDs hesitated to suggest it. It was determined that, education in nutrition science significantly affected the respondents opinions ($P < 0.05$).

Surimi is produced by rinsing minced fish with water to eliminate undesirable odors. It is a functional ingredient and contains myofibrillar proteins and added cryoprotectants (Pietrowski *et al.*, 2011). Good manufacturing practices have been observed during its production. So, surimi is a high quality food product (Pan, 1990). It is clear that, raising the awareness of public for surimi is needed.

Lakerda Consumption

Lakerda is one of the most popular fish products in Turkey, and it is generally produced from bonito by salting. It may be stored at 4°C and safely consumed for 6 months (Turan *et al.*, 2006). It is also a common appetizer in Greece. Surprisingly, 30.59% of the dietitians did not know lakerda and only 22.35% of them suggested its consumption. As to NDs, 23.98% of them had no idea about this product, while most (51.58%) of them suggested its consumption ($P < 0.05$). Since it is a salted product, the risks and benefits of this products must be well presented.

Dried Fish Consumption

Either dietitians (41.18%), or the NDs (40.72%) mostly suggested the consumption of dried fish. Opinions of the respondents were found to be independent of being a nutrition specialist ($P > 0.05$).

Salted Fish Consumption

Although fish salting is a traditional and

common processing method, 18.82% of dietitians and 11.31% of NDs had no idea about salted fish (Table 3). While the dietitians were mostly (35.29%) against salted fish, most of the NDs (40.27%) suggested its consumption. Therefore, NDs were found to be in favour of salted fish consumption, comparing to the nutrition specialists ($P < 0.05$). Since salted fish may be considered as a risk factor for human health (Armstrong *et al.*, 1983), the risks and benefits of it must be well presented to the consumer. A better recognition of salted fish must be provided via education seminars as well.

Marinated Fish Consumption

Most of the respondents did not recognize marinated fish. But the percentages of the unaware respondents were significantly higher ($P < 0.05$) for NDs (72.40%) than that of the dietitians (54.12%). On the other hand, aware dietitians (27.06%) and NDs (14.48%) supported its consumption. According to Brunsù *et al.* (2008), marinated fish is the second preference of the Danish and Polish consumers; and they prefer marinated fish to fresh and frozen fish.

Conclusions

Results from the current study indicate that most of the processed seafood products and preservation technologies are not known by the respondents. Receiving high percentages of the answer "I do not know what it is" from the dietitians was remarkable, indicating their lack of knowledge. In Turkey there are state and private universities, and many of them have nutrition and dietetics departments, graduating dietitians. Training about seafood products and common processing /preservation technologies may not be sufficient or may be ignored in some of them. Differences between the contents of their courses may cause some differences in the opinions and knowledge levels of their graduates. These results validate the importance of a better education on various seafood products and common processing /preservation

technologies to create more informed dietitians and a better informed consumer. Our result may also be helpful to the industry and academia to develop better messages about the current concerns about seafood.

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