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Extended Abstract

# Study of Some Chemical Properties, Electrophoretic Pattern and Sensory Evaluation of Silver Carp Blend Burger with Vannamei Shrimp

**Milad Abbasi Monjezi[1], Seyed Pezhman Hosseini Shekarabi[2*], Seyed Ebrahim Hosseini[3]**

1- MSc. Student, Department of Food Science and Technology, Science and Research Branch, Islamic Azad University, Tehran, Iran
2- Assistant Professor, Department of Fisheries Science, Science and Research Branch, Islamic Azad University, Tehran, Iran
* Corresponding author (hosseini@srbiau.ac.ir)
3- Associate Professor, Department of Food Science and Technology, Science and Research Branch, Islamic Azad University, Tehran, Iran

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## Abstract

In this study, minced vannamie shrimp meat (S) was added to minced farm-raised silver carp fish (F) with four different ratios: 0% (F100), 25% (F75:S25), 50% (F50:S50) and 75% (F25:S75) and then some chemical properties (proximate composition, myoglobin and cholesterol content), electrophoretic pattern as well as sensory parameters were performed. F25:S75 had the highest protein (21.68%) and the lowest fat content (0.91%) compared to other treatments ($P$<0.05). The highest and the lowest amounts of myoglobin were observed in F100 (6.05 mg/g) and F25:S75 (1.11 mg/g), respectively ($P$<0.05). Moreover, F25:S75 had the highest (84.36 mg/100 g) and F100 (42.22 mg/100 g) had the lowest cholesterol content among all treatments ($P$<0.05). The results of SDS-PAGE analysis showed that the most detected number of the bands belonged to F100 (16 bands) and the lowest number of the bands was observed in F25:S75 (14 bands). The highest amounts of α-actinin (5.9%) and β-thropomyosin (15.19%) were observed in F75:S25 ($P$<0.05). The sensory quality demonstrated that the control group (F100) reached the lowest score in terms of texture, smell, taste, and overall acceptance among all treatments ($P$<0.05). The results of this study showed that increasing in shrimp meat proportion in the fish burger would increase the amount of crude protein and sensory scores and also decreased myoglobin content, while the highest cholesterol levels was observed in F25:S75 treatment.

**Keywords:** Blend Burger, Chemical Properties, Electrophoretic Pattern, Shrimp, Silver Carp Fish

## Introduction

In recent years, people's lifestyle has changed due to the progress of urban life. Therefore, consuming home-cooked meals has decreased, while the tendency to consume ready or semi-ready foods particularly minced meat based-products such as burgers has increased in modern life (Taşkaya, Kışla, & Kılınç, 2003).

Fish meat is considerably more digestible than other mammalian meat because of its low stroma content, shorter cross-link lengths and the absence of elastin (Khanipour, Fathi, & Fahim Dejban, 2013). Furthermore, most of the fisheries products are considered as a healthy

food due to high content of unsaturated fatty acids, minerals, and essential amino acids (Burger & Gochfeld, 2009). Consumption of seafood in Iran is low and according to the latest statistical report by FAO, it has reached from 3.7 kg in 2008 to 10.6 kg in 2016, which is still very much lower than global average of 20.3 kilograms (FAO, 2018).

Fish burger is mainly made of low valuable fish species such as carp fish species (Moradinezhad, Shaviklo, & Abolghasemi, 2017). Silver carp (*Hypophthalmichthys molitrix*) is one of the most important and commercial warm water fish species in Iran and world. However, carp fish meat contains more sarcoplasmic proteins and resulted in poor gel properties (Elyasi, Zakipour Rahim Abadi, Sahari, & Zare, 2010). A few studies have been conducted to improve sensory and functional properties of minced carp meat. For instance, Shahin, Kdous, & Hussein (2016) showed that by increasing in shrimp meat in fish burger, some functional properties and cooking loss were improved. Praneetha, Dhanapal, Reddy, Balasubramanian, & Kumar (2017) reported the highest sensory scores in fish cutlets prepared from Rohu belong to the recipe consisting of 45% mince fish and 15% shrimp.

This study aimed to evaluate the effects of different ratios of shrimp meat on some of the chemical and sensory properties of silver carp burger.

## Materials and methods

Fresh farm-raised silver carp fish (4 kg) and vannamei shrimp (2 kg) were obtained from the local market of Tehran and transferred to Science and Research Branch laboratory (Tehran, Iran) with ice. Firstly, the fish were washed with cold tap water, then their head and tail were cut and after manually removing viscera and skin they were again rinsed well. The fish were filleted and skinned manually. Shrimps were first washed with cold water and then were skinned, beheaded and deveined manually. Fish and shrimp meat were minced using a meat grinder (3 mm diameter). In order to reduce the unpleasant smell of fish and remove the sarcoplasmic proteins, the fish minced was washed once with 0.3% Nacl solution with 4:1 ratio (four parts for water and one part for fish) according to Hosseini-Shekarabi, Hosseini, Soltani, Kamali, & Valinassab, (2014) method. Mixed fish minced meats were prepared by 0 (F100%), F75:S25 (75% fish: 25% shrimp), F50:S50 (50% fish: 50% shrimp), and F25:S75 (25% fish: 75% shrimp). Burger samples were made by hand (0.5 cm thickness and 8 cm diameter) without coating based on the conventional method of producing fish burger Hosseini-Shekarabi *et al*. (2014). Proximate composition (i.e. moisture, protein, fat, and ash contents) and pH were measured according to AOAC (2000). Spectrophotometric method was carried out to determine myoglobin content (Benjakul & Bauer, 2000). The enzymatic-calorimetric method was used to measure the amount of total cholesterol according to Allain, Poon, Chan, Richmond, & Fu (1974) with some modifications. Analytical sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) was performed based on Laemmli (1970) with some modification. Sensory characteristics of the burgers such as texture, smell, taste, color and overall acceptability were assessed using a nine-point hedonic scale.

## Results and discussion

As shown in Table (1), F25:S75 had the highest protein (21.68%) and the lowest fat content (0.91%) compared to other treatments ($P$<0.05). The highest and the lowest amounts of myoglobin were observed in F100 (6.05 mg/g) and F25:S75 (1.11 mg/g), respectively ($P$<0.05), (Fig. 1). Moreover, F25:S75 had the highest (84.36 mg/100 g) and F100 (42.22 mg/100 g) had the lowest cholesterol content among all treatments ($P$<0.05). The results of SDS-PAGE analysis showed that the most detected number of the bands belonged to F100 (16 bands) and the lowest number of the bands was observed in F25:S75 (14 bands). The highest amounts of α-actinin (5.9%) and β-thropomyosin (15.19%) were observed in F75:S25

($P$<0.05). The sensory quality demonstrated that the control group (F100) reached the lowest score in terms of texture, smell, taste, and overall acceptance among all treatments ($P$<0.05).

**Table 1.** Proximate composition and pH (%) of blended burgers with different proportion of shrimp minced meat

| Chemical tests | Blended fish burger with shrimp meat | | | |
|---|---|---|---|---|
| | F100 | F75:S25 | F50:S50 | F25:S75 |
| Moisture (%) | 75.83±0.32$^{a}$ | 75.19±0.19$^{a}$ | 74.04±0.55$^{b}$ | 72.84±0.05$^{c}$ |
| Ash (%) | 4.56±0.14$^{a}$ | 4.23±0.33$^{a}$ | 3.77±0.19$^{b}$ | 4.02±0.07$^{a}$ |
| Protein (%) | 18.01±0.35$^{d}$ | 19.18±0.77$^{c}$ | 20.16±0.26$^{b}$ | 21.68±0.94$^{a}$ |
| Fat (%) | 1.8±0.53$^{a}$ | 1.45±0.14$^{a}$ | 1.07±0.08$^{a}$ | 0.91±0.14$^{b}$ |
| pH (%) | 6.17±0.08$^{a}$ | 6.16±0.09$^{a}$ | 6.21±0.06$^{a}$ | 6.28±0.09$^{a}$ |

Data are presented as averaged ± SD.
The different letters in each column showed a significant difference ($P$<0.05).

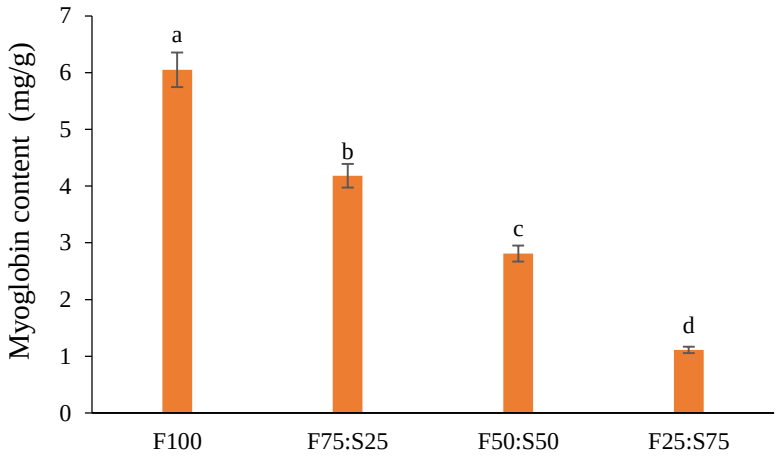


**Fig. 1.** Myoglobin content of blended burgers with different ratio of fish (F) and shrimp (S).

## Conclusions

The results of this study showed that increasing in shrimp meat proportion in the fish burger would increase the amount of crude protein and sensory scores and also decrease myoglobin content, while the highest cholesterol levels were observed in F25:S75 treatment.

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