

# Safety and hygiene of ichthyotherapy with *G. rufa* fish

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## Abstract

Today, biotherapies (therapies using animals, plants or their secretions) are becoming increasingly popular. In medicine and cosmetology, leeches, fish, insect larvae, mucus from *H. aspersa* snail, bee products are used. Among them, ichthyotherapy - therapy with the use of *Garra rufa* (Heckel 1843), which is gaining popularity not only in the exotic resorts of Turkey, Iran and Jordan, but also in Poland, deserves attention. In view of the growing interest in ichthyotherapy, the question arises: Are cosmetic and therapeutic procedures using this vertebrate completely safe for humans? This question became a contribution to taking up this topic of study.

Ichthyotherapy is the use of freshwater, sedentary benthopelagic fish of the cyprinid family, red garra (*G. rufa*), commercially referred to as “the doctor fish”. This fish has a suction apparatus that allows removal of calloused epidermis in patients undergoing therapy. This treatment has been used mainly in cosmetics as so-called fish pedicure, but also in medicine. Scientific reports indicate that this fish may be helpful in treating some skin diseases, i.e. in alleviating the symptoms of psoriasis or atopic dermatitis.

Treatments using the red garra have to be performed in full compliance with hygiene rules. In 2011, the British Health Protect Agency (BHPA) published the guidelines for carrying out treatments using these fish. It specified the indications and contraindications for performing the procedure, the way it should be performed, as well as the threats that could result from possible non-compliance with the principles of occupational health and safety during the procedures.

Case studies of specific ichthyotherapy procedures performed in nine selected salons show that the awareness of people performing the procedures, as well as individuals undergoing ichthyotherapy is relatively low. Salons offering ichthyotherapy services, especially those located in tourist resorts, do not comply with health and safety rules, and thus expose those using the treatments to a potential risk of transmitting zoonotic infections from fish or water to humans.

**Key words:** red garra, *Garra rufa*, ichthyotherapy, fish pedicure, biotherapy

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## Introduction

Nowadays, apart from traditional face and body care and beauty treatments, where mainly cosmetics and salon equipment are used, living organisms or their secretions are more and more often used. The therapies using animals or their secretions are called biotherapy / zotherapy. These include, inter alia, the use of leeches - hirudotherapy, the use of bee products - apitherapy, the use of insect larvae, e.g. brood,

blowfly larvae. In recent years, the procedure performed using toothless fish in the genus *Garra*, species *Garra rufa*, red garra, has been extremely popular. *G. rufa* is a species of freshwater, sedentary benthopelagic fish. Commercially referred to as “the doctor fish”, it can feed on dead skin by doing the so-called fish pedicure. Reports in the literature also indicate that this fish may be helpful in the treatment of psoriasis and atopic dermatitis [1-3].

This alternative cosmetic treatment is currently popular not only in resorts in Turkey, Iran and Jordan, but also in other countries, including Poland. Due to the increased interest in the biology and ecology of *G. rufa*, as well as the way they are used, among others in cosmetology, there are questions about compliance with health and safety at work when performing procedures using it, and thus questions about the possibility of transmitting a pathogenic agent from fish or water to humans. These questions became the inspiration to write this paper.

### Systematics of *G. rufa*

*Garra rufa* (Red garra) - Heckel (1843). Other names of the species that can be found in the literature are: *Discognathus crenulatus* Heckel, 1846-49; *Discognathus obtusus* Heckel, 1843; *Discognathus rufus* Heckel, 1843; *Garra rufa crenulata* Heckel, 1844; *Garra rufa gymnothorax* Berg, 1949; *Garra rufus* Heckel, 1843 [4].

The taxonomy according to Froese and Pauly [5] is as follows:

Kingdom: animals

Type: chordate

Cluster: ray-finned

Range: carp-like

Family: carp family

Genus and species: *Garra rufa* (Heckel, 1843)

Trade name: Fish Doctor

### *G. rufa* biology

The red garra is one of the smallest representatives of the carp family, reaching a length of a few to several centimeters [6,7]. The shape of its body resembles a cylinder with a full lateral line running through the center of the longest part of the tail (Fig. 1). The scales are cycloid. The number of fin rays varies, but the typical number of dorsal, thoracic, abdominal, anal and caudal fins is 8, 12-14, 7-8, 5 and 17, respectively. The number of short filtration

processes varies from 12 to 26, while the pharyngeal tooth system is 2.4.5-5.2.2 or 2.4.4-4.2 [1]. *G. rufa* is characterized by a scaleless head, two pairs of whiskers, a well-developed rebate with free front rims and a sickle lower mouth opening (Fig. 2).

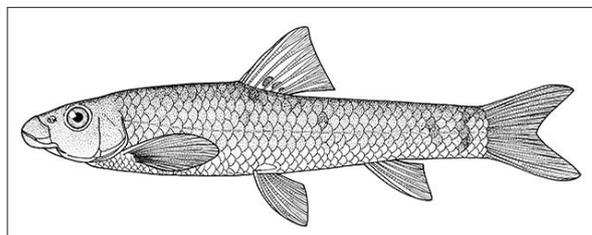


Fig. 1. General form of *G. rufa*, Freshwater fishes of Iran Keys, <http://www.briancoad.com>

The coloration of these fishes is variable, usually brown-olive, to dark green. The abdominal side of the body is usually yellowish or white, the lateral side is dark mottled. Along the whole body there runs a dark or bluish-green band usually ending with a spot at the base of the caudal fin. Behind the upper corner of the gill opening is a greenish blue or dark blue spot, sometimes extending in the form of a line to the base of the pectoral fin.

The fins are usually yellowish with darker rims. At the base of the caudal fin there is a black spot, and the upper lobe of the caudal fin may have several dark gray spots. At the base of each of the four or five medial rays of the dorsal fin, there is also often a dark spot [6]. (Fig. 3).

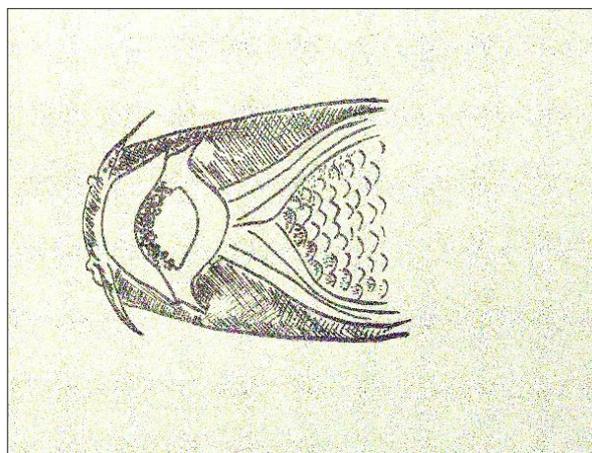


Fig. 2. The red garra (*Garra rufa*) mouth, by Gorzel M. based on Coad B. [6].



Fig. 3. The red garra (*Garra rufa*),  
Photo www.zoovienna.at, source [8]

### *G. rufa* ecology

The red garra is a subtropical species inhabiting various habitats: rivers, muddy streams, ponds and lakes in Eurasia [5]. It prefers stony habitats with a large amount of vegetation, which is a refuge against predators [9]. Typical places of occurrence of this species are: the catchment areas of the rivers Ceyhan, Jordan, Orontes, Quwayq, and the Tigris and Euphrates, the coastal catchment of the Eastern Mediterranean, as well as a large part of southern Iran [6, 4].

*G. rufa* belongs to rheophilic, or current-loving species. As Okur and Yalcin – Ozidilek report [9], it probably prefers clean and well oxygenated waters. These fish can also tolerate adverse environmental conditions such as water pollution, drought and river regulation associated with the degradation of their habitats. Yalcin and Ozdilek [11] report that *G. rufa* is found in the contaminated with industrial, agricultural and municipal waste Asia River. They explain this by a more intense growth of algae, which are an important source of food for these animals. *G. rufa* is a benthopelagic species that lives near the bottom in the middle of water bodies. In typical places of occurrence, it feeds mainly on algae, it prefers cyanobacteria, green and golden-brown algae.

### Application of the red garra in cosmetics and dermatology

The red garra is a fish species willingly used in cosmetics, mainly care and beauty. *G. rufa* is used in cosmetics mainly for foot care treatments, so-called fish pedicure, rarely full body treatments. These fish, feeding on dead skin on the body, cleanse it, and thus nurture, relax and soothe. The procedure itself consists in immersing the body or part of it (usually feet) in swimming pools, aquariums with fish (Fig. 4a and b). The procedure usually lasts from 15 to 30 minutes.



Fig. 4 a and b. Fish pedicure performed by *Garra rufa* fish (Photo by M. Gorzel)



Fig. 5. Aquariums with *G. ruffa* fish for fish pedicure, Fish - Spa, Malta (Photo by M. Gorzel)

There are reports in the literature that *G. ruffa* fish are helpful in the treatment of psoriasis and atopic dermatitis. For the first time, these fish were used in the treatment of skin diseases at the Spa center in Kangal, in the Turkish region of Central Anatolia, where therapy with their help proved effective in the treatment of psoriasis and eczema [1].

Psoriasis is a common skin disease affecting people around the world. It is estimated that the average prevalence of it in Europe and the USA is 2%. One of the alternative methods of treating this disease is, among others, the use of *G. ruffa* fish, which contain the dextranase enzyme in their saliva and mucus covering the body. It is characterized by antimitotic action, blocking the synthesis of DNA and proteins. Under the influence of dextranase, atomic oxygen, peroxide anions and hydroxyl radicals are formed. Dextranase has a strong keratoplastic, bactericidal, fungicidal and anti-seborrhoeic effect. The result is a reduction in cell division and a slow regression of psoriatic lesions [12, 13].

Grasseberger and Hoch conducted scientific research on the effectiveness of fish therapy in the fight against psoriasis outside the Kangal reservoirs [1]. They tried to assess the safety and efficacy of fish therapy in combination with short-term UV exposure in patients with psoriasis vulgaris. The results of their research on 67 patients indicate

a high effectiveness of the treatment of psoriasis vulgaris with *G. ruffa* fish. The effectiveness of fish therapy in the treatment of psoriasis is also confirmed by the studies of Fackler and Agustin [2] and De Groot and Conemans [3].

Fish therapy is undoubtedly becoming an increasingly popular body care method, as well as a method of treating skin diseases. Currently, not only in Turkey, Syria, Iran and Jordan, where these fish are common, but resorts around the world are being created offering various treatments involving these animals.

### Is there a risk to health when using *G. ruffa* fish?

The lack of dentition in *Garra rufa*, and thus their inability to damage the skin during the treatment is the main argument used by owners of Spa centers and beauty salons for the safety of the treatment. Fish business owners also claim that water is constantly exchanged, filtered and sanitized by devices emitting UV rays.

A review of the literature shows that the treatment using *Garra rufa* fish is relatively safe for humans, however there is a risk of transferring the zoonotic agent from fish or water to humans, especially when the principles of occupational health and safety during the procedure are not observed.

In 2011, the British Health Protection Agency (HPA) published guidelines on how to perform treatments using *G. ruffa* fish [14]. It specified the indications and contraindications for performing the procedure, the method of carrying out the procedure itself, as well as the risks that may result from possible non-compliance with the principles of occupational health and safety during procedures.

Contraindications for treatments involving fish listed by the HPA include:

- waxing your legs or shaving them during the day before ichthyotherapy,

- damage to the epidermis, skin abrasions and wounds of the area to be treated,
- infections on the skin surface,
- diabetes mellitus
- active psoriasis, dermatitis at the treatment site,
- viral and systemic infections,
- immunodeficiency,
- dermatitis at the site of surgery.

The HPA notes that there is a risk of transmission of pathogens from fish or the environment to humans. Pathogens isolated from the fish include: *Streptococcus iniae*, *Streptococcus agalactiae*, *Erysipelothrix rhusiopathiae*, *Mycobacterium marinum*, *Salmonella* sp., *Vibrio cholerae*. Most of them carry a negligible risk of infection, although existing. The HPA also lists pathogens that have been isolated from the water, i.e. *Pseudomonas aeruginosa*, *Legionella* sp., but also pathogens originating from humans, i.e. fungi, papilloma virus, *Staphylococcus aureus*. There is a negligible, yet not excludable, risk of infection with HIV and HCV [14].

Current literature shows that fish therapy is relatively safe for human health, but a risk of transmission of a pathogenic agent from fish or the environment to humans cannot be excluded. Therefore, it seems reasonable to strictly adhere to the principles of safety and hygiene during such procedures.

### Case study

The aim of this study was to answer the question: Are the rules of occupational safety and health observed during treatments with *G. rufa* fish and, thus, are the treatments using these fish completely safe for people?

### Research methodology

In order to answer the above question and study objective, i.e. to assess the safety and hygiene of treatments using *G. rufa* fish, the researchers

underwent fish pedicure in nine selected salons performing fish therapy procedures. During the procedures, attention was drawn to the guidelines for conducting biotherapy with fish developed by the Health Protection Agency.

Fish therapy was undertaken in the years 2012 - 2018. Nine salons were selected for analysis: two located on the island of Malta (G1 - located in the capital of the island, G2 - located in a typical holiday resort), three salons located in Poland (two in the northern and one in the central part of the country, G3-G5), two parlours located in Thailand, in the tourist part of the island of Pucket, G6 and G7, and two located in the city of Kuala Lumpur - G8 and G9. The results of the survey are presented in Table 1.

### Results

The results of the conducted research seem to be surprising. In none of the nine analyzed beauty salons the staff provided information on the methodology of the procedure using *G. rufa* fish (Table 1). Apart from the instructions on removing shoes and rinsing the feet, there were no questions regarding skin diseases, such as ringworm, atopic dermatitis, or questions about skin abrasions and other micro-injuries. The salons did not inform about indications and contraindications to perform fish therapy treatments. In none of the parlours were the correct diagnostics performed of the skin of the feet to be treated. In three salons, the personnel performing the procedure asked if the client had visible wounds or abrasions on the feet.

Before the fish pedicure procedure, the feet were washed in each of the parlours, two of them used soap and warm water for this purpose and the feet were dried, in four salons the feet were washed with soap and water but they were not dried, in another two they were rinsed with water alone. None of the staff performing the procedure

paid any attention to the painted toenails, and thus nobody asked to remove the nail polish.

The ichthyotherapy procedure itself lasted from 15 to 30 minutes and consisted in immersing the legs (up to half of the lower leg length) in the aquarium in which the fish were swimming. After the procedure, the feet were dried; in four facilities

with a cloth towel, in the other five with disposable towels. Feet were not examined in any of the analyzed salons after the procedure to check for possible wounds or abrasions. Nowhere were the feet washed after the pedicure. In three treatment rooms the staff did not even have disposable protective gloves.

Tab. 1. Activities recommended by the HPA (2011) when performing treatments with *G. rufa* in relation to three selected beauty salons offering fish therapy services.

Activities recommended by the HPA (2011) during fish therapy procedures	G1	G2	G3	G4	G5	G6	G7	G8	G9
Familiarizing the client with the methodology of the fish pedicure procedure	-	-	-	-	-	-	-	-	-
Providing information on indications and contraindications for the procedure	-	-	-	-	-	-	-	-	-
Diagnostics of the skin subjected to the procedure, i.e. visual inspection of the foot to exclude wounds, abrasions, etc. - No diagnostics + Some general questions ++Foot skin examination and interview concerning possible diseases	-	+	+	+	+	+	-	-	+
Use of disposable gloves by the personnel performing the treatment	+	-	+	+	+	-	-	+	+
Removing nail polish	-	-	-	-	-	-	-	-	-
Washing the foot skin before the procedure - the skin was not washed + rinsing the foot skin with water only ++ washing the feet with soap and water +++ washing the feet with soapy water and drying them	+	+++	++	++	++	++	+	+	+++
Length of treatment [mins]	15	20	20	20	15	30	20	10	15
Foot washing after treatment	-	-	-	-	-	-	-	-	-
Drying the feet after the procedure * cloth towel, reusable ** disposable towel	+	+	+	+	+	+	+	+	+
	*	*	**	**	**	*	*	**	**
Examination of the feet after the procedure	-	-	-	-	-	-	-	-	-

key:

- failure to perform the indicated action

G - beauty and biotherapy clinics where fish therapy sessions are carried out; location:

G1 - on the island of Malta

G2 - on the island of Malta (in a tourist resort)

G3 - in the northern part of Poland

G4 - a biotherapy clinic in the northern part of Poland

G5 - a beauty salon in central Poland

G6 - on the island of Phuket in Thailand

G7 - on the island of Phuket in Thailand (in a tourist resort)

G8 - in Kuala Lumpur, Asia

G9 - in Kuala Lumpur, Asia

## Summary

Therapies using animals or their secretions have been known since antiquity. Nowadays, when the cosmetics, pharmaceutical and foodstuffs markets are based on highly modified, or far from natural, products and services, we are increasingly eager to return to natural and often unconventional ways and methods. Increasingly, beauty salons and wellness centers, SPA and beauty clinics offer new, unconventional, and often exotic, treatments, such as snake massage, snail, leech or fish treatments. In the pursuit of excitement with these extravagant services and accompanying feelings you can forget about security. Unconventional treatments, relatively recently introduced to the offer, may prove highly risky, due to the lack of mandatory sanitary guidelines for carrying them out. Other potential hazards result from the lack of knowledge about all aspects that may carry a risk when introducing a new treatment to the market.

As the analysis of the quality of *G. rufa* fish treatment services in various parts of the world shows, the awareness of people undergoing, as well as those performing procedures of fish therapy is relatively low. Salons offering such services, especially those located in tourist resorts, do not comply with the principles of hygiene and safety at work, and thus expose persons using fish therapy to the risk of transferring pathogens from fish or the environment to humans, as well as from human to human through water.

Despite the relatively low risk of infections associated with ichthyotherapy [14], it is absolutely necessary to comply with the principles of occupational health and safety during such procedures. The most important of them include: familiarizing the client with the methodology of the procedure, indications and contraindications, as well as possible complications that may occur afterwards. Accurate diagnostics of the skin to be treated by the procedure seems important, including inspection

of skin abrasions, microwounds, skin eruptions, etc. Preparation of the patient for the procedure, i.e. thorough washing of feet with soap and water and drying them, both before and after the procedure, preferably with a disposable paper towel, is another extremely important issue. Nail polish should be removed before the procedure, as there may be discoloration of the nail, or other signals under the nail polish that may indicate a medical condition, such as athlete's foot. All decorations, including jewelry, should be removed for the procedure.

An important element in ensuring safety during treatments with *G. rufa* fish seems to be hygiene and safety at work in the beauty salon itself, which should be prepared for this type of treatment. Aquariums with fish should be filled with clean, clear and fresh water, which should be systematically filtered and sanitized, as well as checked. The room where the treatments are performed should have foot washbasins and washable floors. Staff performing procedures of ichthyotherapy should have knowledge about the biology and ecology of *G. rufa* fish, methodology of the procedure, as well as knowledge about pathogens and diseases threatening human health and the fish itself. Staff should use disposable gloves as well as disposable towels to dry the affected skin.

The use of animals in cosmetic therapies is associated with the risk of transmission of a pathogenic agent from the animal or the environment to humans; however, this risk can be minimized. Anyone visiting the salon can reduce the risk of infection by taking simple precautions and compliance with hygiene rules. Any customer concerned about the level of cleanliness in the salon should report it to the local environmental health department.

An important aspect in ichthyotherapy which was not presented in this paper seems to be the well-being of the fish. Fish should come only from legal farms and should be systematically examined

by an ichthyologist. They should be provided with conditions close to natural, should not be crowded or “overworked”.

An analysis of nine cases is not enough to be able to draw irrefutable conclusions about the occupational health and safety of facilities offering treatments in the field of fish therapy. However, these studies are a contribution to a thorough insight into the guidelines for carrying out ichthyotherapy and, above all, to special attention to the health and safety at work during such procedures. All people using this type of therapy should carefully ask about the indications and contraindications for the procedure, pay attention to the cleanliness of the salon and to the personnel conducting the procedure.

### Conclusions

The case study as well as the review of available literature allowed to formulate the following conclusions:

1. Special hygiene and infection control standards should be maintained in all biotherapy facilities.
2. The practices of biotherapists, including ichthyotherapists, should be systematically monitored.
3. Ichthyotherapy treatments should be carried out according to the highest hygiene standards, while maintaining fish welfare, which should be healthy and come from legal farms.
4. Development of appropriate standards specifying sanitary requirements for clinics/salons offering fish pedicure services should be undertaken.
5. Personnel performing fish therapy should have knowledge about the biology and ecology of *Garra* fish.

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