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Risk of Gastrointestinal Cancer in Mice after Consuming Salted and Dried Fish in Van-Erciş Region

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Abstract: This study aimed to investigate the cancerogenic effect of salted-fish samples (*Chalcalburnus tarichi*) on male and female mice. Eighty mice were fed with either salted fish and standart rat pellets separately (n=40) or only standart rat pellets (n=40) for 383 days. It was observed that the whole salted fish was eaten hungrily by mice. One mouse from each group and each sex were sacrificed in every month and liver, heart, esophagus, stomach, intestines, kidneys, testes and breasts were examined histopathologically. Serum BRMA (CA 15-3) (for breast cancer), GI-MA (CA 19-9) (for pancreatic and colo-rectal cancer), OMMA (CA 125) (for ovarian cancer) and CEA (for colo-rectal cancer) levels were measured as tumor markers. There was no histopathological or biochemical evidence of GI cancer in mice fed with salted fish. Only one animal developed lung cancer as a malignancy. Salted fish appears to have no association with GI cancer in mice.

Key words: Salted fish, *Chalcalburnus tarichi*, gastrointestinal cancer, mice

INTRODUCTION

Gastrointestinal cancers are important causes of morbidity and mortality in Turkey and all over the world. Twenty percent of cancer deaths are usually related to gastrointestinal cancers in the world[1]. In Turkey, the frequency of gastrointestinal cancers is the highest (27%) among all the cancer groups in Eastern Turkey where Van is located. Türkdoğan *et al.*[2] reported that the ratio of gastrointestinal cancers (especially gastric and esophageal) was 10% in Van. Many ecological risk factors, especially dietary (home smoked and salty foods rich in polycyclic hidrocarbons, nitrates ant nitrites; hot tea and well water drinking etc.), *Helicobacter pylori* infection, heavy metals and radioactivity, socioeconomic and cultural underdevelopment in rural areas play an essential role in the ethiopathogenesis of upper gastrointestinal cancers in Van region[3].

The fish *Chalcalburnus tarichi* Pallas 1811 called İnci kefali is salted and consumed in various ways in Van-Erciş region. Küçüköner *et al.*[4,5] reported that the dry matter contents have been ranged between 50.59 and 86.34%, mineral matter contents between 15.01 and 29.12%, salt contents between 12.91 and 26.10%, while acid contents between 5.25 and 5.56% in the salted-fish samples. The salt proportion has been found at very high level in the samples. Some chemical properties of *Chalcalburnus tarichi* were reported as having avarage dry matter 26.28%, water content 73.72%, fat content 1.96%, total ash content 1.78%, protein 19.17% and pH 6.49 were obtained. The contents of Ca, K, Zn, Cu, Mn, Fe and Mg were determined as 85.60, 296.91, 1.441, 1.022, 0.200, 1.750 and 6.386 mg/100 g, respectively[6].

Sarı *et al.*[7] carried out a public survey in order to determine fish consumption habit was in 381 people in Van Province. According to survey results, 88.2% of people enjoyed consuming fish but 11.8% did not. Although the most preferred fishes were trout, *Chalcalburnus tarichi* and carp; the most consumed fishes were *Chalcalburnus tarichi,* carp, trout and anchovy. Salt and salted foods are probable risk factors, based on evidence from a large number of case-control, ecological and cohort studies[8-11], evidence from prospective investigations is scarce and inconsistent[12-14]. The recent report of a joint WHO/FAO Expert Consultation concluded that Salt-preserved foods and salt probably increase the risk of stomach cancer[15].

In this study we aimed to investigate the cancerogenic effect of salted-fish samples (*Chalcalburnus tarichi*) on male and female mice.

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MATERIALS AND METHODS

Swiss albino mice (20-25 g) were used in these experiments. The animals were housed in standard cages, at room temparature (20±2°C) with artificial light from 7.00 am to 7.00 pm. The animals were kept under controlled environment following the standard operating procedures of the animal house facility of the Faculty of Medicine (University of Yüzüncü Yıl) and provided with pelleted food (Van Animal Feed Factory, Van, Turkey). The approval of Animal Ethics Committee was obtained.

Eighty mice were divided into two groups of forty animals each. Group I, which served as control, ate only standard food, Group II which served as salted-fish group, fed pelleted food and salted-fish for 383 days (10 November 2001-28 November 2002). On each day two salted fish are partially re-hydrated in tap water to soften enough to be eaten by mice. Local people in Van-Erciş region prepare it in a similar way before serving. All the animals were observed daily and any dead animals were subjected to post-mortem examination to find the cause of death. One animal from each group was sacrificed in every month and liver, heart, esophagus, stomach, intestines, kidneys, testes and breasts were examined histopathologically. At the end of the treatment, blood samples were collected by direct cardiac puncture and the serum was used for the assay of tumor marker enzymes, serum BRMA (CA 15-3) (for breast cancer), GI-MA (CA 19-9) (for pancreatic and colo-rectal cancer), OMMA (CA 125) (for ovarian cancer) and CEA (for colo-rectal cancer). All animals were sacrificed at the end of the treatment and the organs were examined histopathologically.

The serum BRMA (CA 15-3), GI-MA (CA 19-9), OMMA (CA 125) and CEA concentrations were determined with a Immulite 2000 chemistry analyzer.

The organs of the experimental animals were fixed in 10% neutral buffered-formalin prior to routine processing in paraffin-embedded blocks. Sections (4 μm thick) were cut and stained using Hematoxylin-eosin (HE) stain.

Chi-square test was used for determining significance.

RESULTS AND DISCUSSION

There was no histopathological or biochemical evidence of GI or others cancer in mice fed with salted fish (Table 1). Results are in accordance with Galanis *et al.*[16] who reported that no significant relationships were found between gastric cancer incidence and the intake of dried or salted fish among either genders. Only one animal developed lung cancer (adenocarcinoma) as a malignancy (Fig. 1). No relationship could be found between lung cancer and the intake of salted fish. Thus it is concluded that salted fish appears to have no association with gastrointestinal or other system cancers in mice.

Table 1: Comparison of concentration of the serum tumor markers in the salted-fish fed and control groups

	BRMA(CA-15) ($U\ mL^{-1}$) (7.50-53.00)*		GI-MA(CA 19-9) ($U\ mL^{-1}$) (0.00-33.00)		CA 125 OMMA ($U\ mL^{-1}$) (1.90-16.30)		CEA ($U\ gL^{-1}$) (0.00-5.20)	
Groups	< 1.00	≥ 1.00	< 2.50	≥ 2.50	< 1.00	≥1.0	< 0.20	≥ 0.20
I	16	0	13	3	16	0	16	0
II	16	0	10	6	16	0	16	0
p-value	p>0.05		p>0.05		p>0.05		p>0.05	

*: Normal expected range

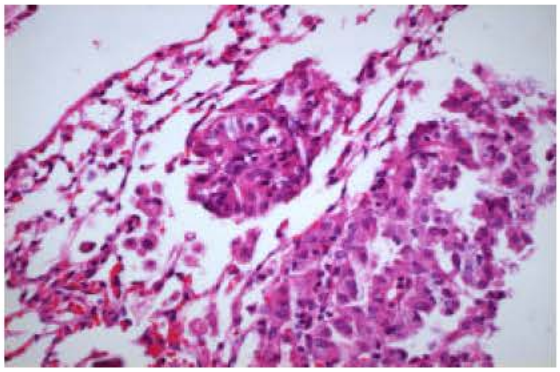

Fig. 1: Lung cancer (adenocarcinoma) on a mice (HE, X 20)

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