



## LETTERS TO THE EDITOR

# Role of silis in esophageal cancer

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## Abstract

Association of silica with diseases like cancers has been determined previously. This study was designed to determine the quantity of silis in flour produced in Golestan Province, and its relation to esophageal cancer (EC). We took flour samples from all flour millings in Golestan Province. Base-melting method in nickel crucible was used at 550°C. The extract was reduced with acids. Different silis concentrations in various regions were compared.  $P < 0.05$  was considered statistically significant. The median silis concentration was 0.0030 g, the mean silis concentration was  $0.008760 \pm 0.004265$  g in each 100 g flour. The difference of mean silis concentrations in various regions was not significant. No high level of silica was found in the flour of Golestan Province. We could not find any significant difference in various areas between silica contaminations. Studies on the consumed bread and rice in various regions of Golestan Province can be helpful.

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**Key words:** Silis; Esophageal cancer; Flour; Milling; Iran

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Silica ( $\text{SiO}_2$ ) is an oxide of silicon. Its existence in food

products is a presentation of contamination. Some studies revealed that silica exposure may play a role in diseases like cancer<sup>[1]</sup>, although its definite effect has not been confirmed in some cancers like esophageal cancer. The International Agency for Research on Cancer (IARC) has classified crystalline silica as a known human carcinogen in lung cancer<sup>[2]</sup>. The excess risk of esophageal cancer (EC) mortality among caisson workers with silicosis explains best by the very heavy exposure to free silica dust in their working environment<sup>[3-8]</sup> and their silicosis as an underlining disease.

A case-control study of the relationships among silica exposure, gastric cancer, and EC in Japan, suggested that gastric cancer and EC are related to silica exposure and silicosis in that area, although they did not reach a statistically significant level<sup>[9]</sup>.

O'Neill *et al*<sup>[9]</sup> reported that the contamination with fibrous silica contaminant is high in the diet of north-east of Iran. Low quality of wheat and its contamination with weed and sand are considered important<sup>[10]</sup>. The northeastern part of Iran in Golestan Province (Turkmen Sahra) is known to have the highest incidence of EC in the country and to be one of the highest areas in the world<sup>[11]</sup>. Golestan Province is located on the hot spots that are along a presumptive belt starting from northern China, extending along the southern parts of the former Soviet Union and ending in the Caspian littoral in northern Iran.

In 1982, O'Neill *et al*<sup>[9]</sup> reported an association of silica fibers in the millet bran and esophageal tumors in another study. In 1986, Newman<sup>[1]</sup> found that certain plants contain structures consisting of biogenic silica, which has been supposed as a causative agent in the high cancer areas of Southern Africa, Northeast Iran and North of China. It is hypothesized that these plant mineral fibers are involved in the etiology of EC in Iran and in other high incidence areas. *Phalaris minor* is a known common weed in the Mediterranean area, but it is not considered a region with a high incidence and prevalence of EC.

Some findings suggest that silica particles might be involved in the etiology of EC. In fact, different results are available about the significant relationship between silis exposure and EC, some are in agreement and suppose that silis plays a role in the etiology of EC, and others are in disagreement.

In our study, silis but not its compound or its biologic derivatives was considered a carcinogen. Flour samples from all flour millings in Golestan Province were taken. Base-melting method in nickel crucible was used at 550°C and the extract was reduced with acids. The complex was evaluated with a spectrophotometer (820 nanometer wavelength). Five control samples of wheat seeds and pedicles were examined, too. The different silis median concentrations in

wheat seeds, pedicles and flour were statistically significant. However, the total silis in the flour was in the normal range because a great deal of silis was omitted from the flour during the preparing process. The modern and new purification technologies may be effective in producing these results, so the previous contaminants can be supposed less important.

The mean silis concentration was 0.012, 0.01 and 0.003 in the central, western and eastern parts of Gorgan City, respectively. The differences were not statistically significant. The Golestan province was divided into 3 areas according to the incidence of EC and we matched the data with the location of flour millings on the map.

Our findings suggest that there are no significant differences in flours of various areas, revealing a less important role of silis in EC. However, from a medical point of view it is important. There is a great variation in the incidence of EC between countries and regions. The distribution of EC in Golestan Province is not concordant with the amount of silis reported in this study. Silis concentration is higher in the west part but EC is higher in the east.

Despite the high incidence of EC in Northeast Iran, no significant differences were seen between silis in wheat flour of this area and standard measures. It seems that silis could not play a major role in the etiology of EC or is considered a predisposing factor when we eat it. Perhaps, oral or inhalation absorption of silis has an effect on its carcinogenicity. This hypothesis becomes acceptable when we pay more attention to the main component of earth crust. Silis, an abundant mineral in rock, sand, and soil, is in contact with our skin, but it is not supposed as a carcinogen or a predisposing factor.

Previous studies have reported a considerable concentration of silica in the flour produced in this area and suggested a relationship between EC and silis. In this study, no high level of silica was found in the flour of Golestan Province. Thus, on the one hand, we could not confirm the hypothesis of high contamination of the flour in this area, which is considered a high risk of EC in Golestan Province. On the other hand, we could not rule out the probable role of this element in the etiology of EC. Studies on the consumed bread and rice in various regions of the province can be helpful.

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