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Corrected version

Elevated morphine levels in poppy seeds: Risk to health not ruled out

BfR recommends a guidance value and a daily upper intake level

Poppy seeds have a distinctive taste and are rich in fat and proteins. That's why they are a popular choice for bread, rolls and cakes or for edible oil. Although the seeds come from opium poppy from which pharmaceutical alkaloids like morphine or codeine are also produced, edible poppy naturally only contains traces of these substances. However, analyses have revealed that the morphine levels in edible poppy seeds vary considerably and have obviously increased in recent years. Types of poppy, harvesting time and geographical origin can all influence the alkaloid levels. The main reason for the clearly elevated values is probably contamination caused by alkaloid-containing fragments of seed capsules or milky sap during seed collection. In unfavourable scenarios morphine levels can be ingested from food which are in the therapeutic range. "In the worst case doses of this kind can lead to impaired consciousness, respiratory depression and cardiovascular effects", warns BfR President Professor Dr. Dr. Andreas Hensel. In order to rule out this risk for the consumer, BfR has established a daily upper intake level and recommended a guidance value for morphine on behalf of the Federal Ministry of Consumer Protection. Until manufacturers have succeeded in reducing the morphine levels, the Institute advises against excessive consumption of foods containing large amounts of poppy seeds – particularly during pregnancy.

Opium poppy *Papaver somniferum* is a traditional medicinal plant. Opium and alkaloids are extracted from the dried milky sap of the immature seed capsules. Morphine and codeine are two of the most well-known opium alkaloids. Morphine is used to treat severe pain. The adverse reactions, that may occur, include nausea, vomiting, light-headedness, respiratory depression and cardiovascular effects. Individual sensitivity to this substance varies considerably. In animal experiments morphine was observed to have negative effects on the development of offspring and reproduction. Mutagenic effects were also recorded.

Besides the medical importance of opium poppy, the plant also plays a role in the domain of food. The mature seeds are used predominantly in poppy cakes but also in smaller amounts on rolls and bagels. Because of their high oil content, edible oil is produced from the seeds, too. Although the seeds may also contain alkaloids, they only occur naturally in traces. Hence, edible poppy seeds are only likely to contain the smallest amounts of morphine.

Studies on alkaloid levels in edible poppy seeds have, however, revealed that the levels vary markedly and have increased overall in recent years. Types of poppy, harvesting time and geographical origin could all influence the alkaloid levels. The main reason for the increase seems, however, to be the contamination of the seeds with alkaloid-containing capsule fragments or the milky sap itself. Possible causes under discussion are recently introduced harvesting methods in which the capsules are squashed and the milky sap released could contaminate the seeds.

In unfavourable circumstances, normal consumption of poppy seed-containing foods could lead to the ingestion of morphine amounts which are in the therapeutic range. The overall range of adverse reactions could then occur. They include central nervous and peripheral effects like impaired consciousness, respiratory disorders and cardiovascular effects.

It is clear that highly contaminated poppy seeds are dangerous and not suited for placement on the market or consumption. The health assessment of the consumption of poppy seeds with low morphine concentrations is more difficult from the precautionary angle. In order to give official food control a tool for this, BfR has established a "provisional daily upper intake level" for morphine which may not be exceeded. It is 6.3 microgram per kilogram body weight and day. Taking into account the estimated amounts consumed, this leads to a provisional guidance value for poppy seeds of a maximum of 4 microgram morphine per gram.

The Federal Institute for Risk Assessment calls on manufacturers to do everything in their power to reduce the levels of all pharmacological active opium alkaloids to the technologically feasible minimum level. Until this has been done, consumers and, more particularly, pregnant women should reduce or completely stop their consumption of foods with a high level of poppy seeds. They include poppy seed cakes, poppy seed containing desserts and pasta dishes like sweet yeast puddings dusted with poppy seeds.

Further information on this subject can be accessed in German language in an extensive expert opinion on the BfR homepage on www.bfr.bund.de under Lebensmittel/Lebensmittelsicherheit/Stoffliche Risiken.

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