Assessment of Dietary Intake of Potassium in Relation to Upper Guidance Level

Margaretha Haugen1*, Inger Therese L. Lillegaard2, Livar Frøyland3, Sigrun Henjum4, Martinus Løvik5, Tonje Holte Stea6, Tor A. Strand7 and Kristin Holvik1

1Norwegian Scientific Committee for Food Safety (VKM), Norwegian Institute of Public Health (FHI), Norway.
2Norwegian Scientific Committee for Food Safety (VKM), Norway.
3Norwegian Scientific Committee for Food Safety (VKM), Institute of Marine Research, Norway.
4Norwegian Scientific Committee for Food Safety (VKM), Oslo and Akershus University College of Applied Sciences (HiOA), Norway.
5Norwegian Scientific Committee for Food Safety (VKM), Norwegian University of Science and Technology (NTNU), Norway.
6Norwegian Scientific Committee for Food Safety (VKM), University of Agder, Norway.
7Norwegian Scientific Committee for Food Safety (VKM), Innlandet Hospital Trust, Norway.

Authors’ contributions

This work was carried out in collaboration between all authors. The opinion has been assessed and approved by the Panel on Nutrition, Dietetic Products, Novel Food and Allergy of VKM. All authors read and approved the final manuscript.

ABSTRACT

The Norwegian Scientific Committee for Food Safety (Vitenskapskomiteen for mattrygghet, VKM) has, at the request of the Norwegian Food Safety Authority (Mattilsynet; NFSA), evaluated the intake of potassium in the Norwegian population. VKM has also evaluated the consequences of amending the existing maximum limit for potassium at 1000 mg/day to 300, 2000 or 3000 mg/day in food supplements.

Potassium is an essential mineral to humans and is important as the osmotically active element inside the cells, whereas sodium and chloride are the main elements outside the cells. The enzyme Na+/K+-ATPase pumps potassium ions into the cells and sodium ions out of the cells and helps keep the intracellular potassium concentration about 30 times higher than that of plasma and interstitial fluids.
The plasma potassium concentration is maintained within narrow limits (3.5 to 5.0 mmol/L) by multiple mechanisms making up the potassium homeostasis. The strict regulation is essential for a broad array of important physiological processes, like the resting cellular membrane potential and the transmission action in neuronal, muscular and cardiac tissue. Potassium is also important for hormone secretion, vascular tone, systemic blood pressure control, gastrointestinal motility, acid-base balance, glucose and insulin metabolism, mineralocorticoid action, renal concentration ability and fluid and electrolyte balance. Both hypo- and hyperkalaemia result in increased mortality.

The EFSA recommendations (2016) for adequate intake (AI) of potassium is 3500 mg/day for adults, both sexes, whereas the recommended intake (RI) in the Nordic Nutrition recommendations (2012) is 3500 mg/day for men and 3100 mg/day for women.

Tolerable upper intake levels have not been established for potassium from food, because intake from food has not caused adverse health effects in the healthy population. In children the renal function rapidly reaches the normal adult level in early childhood and no concern about high intake of potassium from food has been put forward.

Potassium chloride supplement has, however, resulted in hyperkalaemia and case reports have described heart failure and cardiac arrest at plasma concentrations above 5.5 mmol/L and doses over 6.5 - 6.8 g supplementary potassium per day.

VKM proposes to use 3000 mg/day of potassium as an upper guidance level for daily dose of supplemental potassium in adults since this dose has not been shown to cause hyperkalaemia or heart failure, and has not resulted in gastrointestinal lesions.

The proposed upper guidance level for adults extrapolated for body weights corresponds to 2630 mg/day for adolescents 14 to <18 years, 1860 mg/day for children 10 to < 14 years and 990 mg/day for children 3 to 10 years.

For vulnerable groups all doses of potassium supplementation could lead to hyperkalaemia. Vulnerable groups such as persons with impaired kidney function and elderly have been estimated to comprise 15-20% of the population of Norway. However, most of the vulnerable individuals will be aware of the condition and be under medical supervision.

Accordingly, all the evaluated doses from NFSA (300, 1000, 2000 and 3000 mg/day of potassium in food supplements are at or below the suggested upper guidance level for supplemental potassium for adults (>18 years). In adolescents 14 to <18 years, the supplemental doses of 300, 1000 and 2000 mg/day are below the suggested upper guidance level. For the younger age groups, only 300 mg/day is below the suggested upper guidance level for supplemental potassium.

**Keywords:** VKM; risk assessment; Norwegian Scientific Committee for Food Safety; potassium; food supplement; upper level; exposure.

Available: https://vkm.no/download/18.773639b215c8657f2a4830ab/1497967251397/Assessment%20of%20dietary%20intake%20of%20potassium%20in%20relation%20to%20upper%20guidance%20level.pdf

**ISBN:** 978-82-8259-274-1

**NOTE:**

This work was carried out in collaboration between all authors. The opinion has been assessed and approved by the Panel on Food Additives, Flavourings, Processing Aids, Materials in Contact with Food and Cosmetics of VKM. All authors read and approved the final manuscript.

Competence of VKM experts: Persons working for VKM, either as appointed members of the Committee or as external experts, do this by virtue of their scientific expertise, not as representatives.
for their employers or third party interests. The Civil Services Act instructions on legal competence apply for all work prepared by VKM.


COMPETING INTERESTS

Authors have declared that no competing interests exist.

© 2018 Haugen et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.