Combined monitoring of iodine and sodium intakes in Belgium


Background
In the years 1985–1998, it was first noted that mild iodine deficiency (MID) was a public health problem among school-aged children in Belgium [1]. In order to optimize the iodine status in Belgium, a voluntary agreement was concluded in 2009 between the bakery sector and the Federal Minister of Public Health to promote the use of iodized salt in bread (10–15 ppm). No reliable data are available on the use of iodized salt by the bakers in Belgium. Furthermore in Belgium iodized salt is allowed to be used in processed food and feed stuff. The 2010 study among Belgian children showed that 37% of Belgian households used iodized salt [2]. A similar figure (38%) was found in the most recent Belgian national food consumption survey [3].

A representative national survey among school-aged children in 2010–2011 showed that they were iodine sufficient (median urinary iodine concentration (UIC) = 113.1 μg/l) and that iodine status had significantly improved compared to 10 years earlier (median UIC = 80 μg/l) [1,2]. However, women of child-bearing age were found to be still suffering from MID with a median UIC of 84 μg/l [2]. The median UIC during pregnancy (118.3 μg/l in the first and 131.0 μg/l in the third trimester) indicated MID among pregnant women in Belgium and some groups of women (younger women, women not taking iodine-containing supplements, women with low consumption of milk and dairy drinks) were found at a significantly higher risk of iodine deficiency [4].

Generally, iodine deficiency in European countries is mild. The main consequences of mild iodine deficiency in adults are a higher prevalence of thyroid nodules and in children, impaired cognition and reduced IQ.

The WHO recommends limiting sodium intake to 2 g per day (equivalent to 5 g of salt per day). The Belgian Superior Health Council (HGR) follows this recommendation. In 2009, it was found that salt intake among Belgian adults aged 45–65 years was twice as high (on average 10.5 g per day) as the WHO and HGR recommendations.

The aims of the present study were to measure sodium and iodine concentrations in urine spot samples among a representative sample of Belgian adults as part of the first Belgian Health Examination Survey (BELHES) and to verify whether the Belgian adult population reached WHO recommendations for salt and iodine intakes.

Young women in Belgium have borderline low iodine intakes
The Belgian Health examination survey (BELHES)

In 2018 the sixth Belgian Health Interview Survey (HIS) was organized. Information on the health status, lifestyle, health care use, and socio-demographic characteristics was collected among a representative sample of 11,611 people residing in Belgium (total population = 11,482,178 in 2018). All Belgian provinces were included. Eligible HIS participants who were at least 18 years of age were invited to participate also in a Health Examination Survey (HES) until a predefined number (n = 1100) was reached. As the fieldwork continued for a short period after recruitment was stopped, finally 1184 people participated.

A spot urine sample of minimum 50 ml was collected in a polypropylene container. In about 98% of the cases the samples were taken before noon. Out of 1184 BELHES participants, 1166 provided a urine sample. For 1132 participants, sodium and creatinine could be analyzed. Thereafter, for 1106 participants there was still sufficient urine volume to analyze iodine. Out of the 1132 participants for whom sodium and creatinine were analyzed in their urine sample, participants without information on measured weight and/or height (N = 5) and pregnant women (N = 7) were excluded. In total, 1120 (95.0%) BELHES participants were included in the final sample. Various equations exist to estimate 24-h sodium excretion from spot urine samples [21–24].

Iodine excretion

Out of the 1106 participants for whom iodine and creatinine were analyzed in their urine sample, pregnant women (N = 7) and participants with extremely high iodine concentrations (N = 7), indicating acute or chronic iodine overexposure, were excluded. In total, 1092 (92%) BELHES participants were included in the final sample.

The study sample included about 50% of women, 31% of 18–39 year olds, and 23% of participants older than 65 years. Median creatinine levels were 141.3 (IQR = 98.2–199.8) mg/dl; 165.2 (IQR = 115.7–214.5) mg/dl for men and 121.6 (IQR = 84.6–175.7) mg/dl for women (data not shown).

Overall, median UIC among Belgian adults was 93.6 μg/L. About 12.1% of Belgian adults had a UIC below 50 μg/L, while 2.2% of adults had a UIC above 300 μg/L (Table 1). When expressing the iodine concentrations in μg/g creatinine, the median UIC was 60.8 ± 1.9 μg/g creatinine for men and 73.1 ± 2.4 μg/g creatinine for women.

<table>
<thead>
<tr>
<th>Population</th>
<th>N</th>
<th>Median (SE)</th>
<th>% (SE) &lt;100 μg/L</th>
<th>% (SE) &lt;50 μg/L</th>
<th>% (SE) &gt;300 μg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1092</td>
<td>93.6 (2.3)</td>
<td>56.0 (2.0)</td>
<td>12.1 (1.1)</td>
<td>2.2 (0.5)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>528</td>
<td>94.2 (3.3)</td>
<td>54.8 (2.9)</td>
<td>10.1 (1.5)</td>
<td>1.8 (0.6)</td>
</tr>
<tr>
<td>Female</td>
<td>564</td>
<td>91.7 (2.9)</td>
<td>57.3 (2.6)</td>
<td>14.2 (1.6)</td>
<td>2.5 (0.7)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>18–39 years</td>
<td>287</td>
<td>98.0 (5.6)</td>
<td>52.4 (4.2)</td>
<td>8.8 (1.8)</td>
<td>1.3 (0.6)</td>
</tr>
<tr>
<td>40–64 years</td>
<td>572</td>
<td>91.0 (2.5)</td>
<td>57.8 (2.6)</td>
<td>13.6 (1.7)</td>
<td>2.3 (0.7)</td>
</tr>
<tr>
<td>&gt;65 years</td>
<td>233</td>
<td>93.4 (4.3)</td>
<td>57.3 (4.0)</td>
<td>13.8 (2.3)</td>
<td>3.1 (1.2)</td>
</tr>
</tbody>
</table>
There were no significant differences in median UIC between sexes, age groups, and regions in Belgium, but males had higher median UIC than females, and the youngest age group (18–39 years) had higher median UIC than the other age groups (Table 1). The median UIC among participants who reported thyroid problems during the last 12 months (median UIC = 104.1 μg/L) was significantly higher (p < 0.001) than the median UIC among those who did not report thyroid problems (median UIC = 92.2 μg/L).

**Salt intake**
The average population salt intake was 8.3 ± 0.1 g per day using the Tanaka equation and 9.4 ± 0.1 g per day using the INTER-SALT equation. For both equations, <5% of the population met the recommended salt intake level of <5 g per day. Salt intakes were significantly higher for males than females.

**Discussion**
This study, based on a representative sample of Belgian adults, showed that the median UIC (94 μg/L) was below the WHO threshold for population iodine sufficiency (100 μg/L), likely indicating MID, while population salt intake was substantially higher than the WHO recommendation of 5 g/day. Iodine status among nonpregnant adult women significantly improved in Belgium over the last decade. A previous national survey conducted among school-aged children and their mothers in 2010–2011 indicated iodine sufficiency among children (median UIC=113 μg/L), but MID among their mothers (median UIC=84.4 μg/L or 66.0 μg/g creatinine) [2]. Population salt intake was substantially higher than the WHO recommendations. Further policy efforts are needed to optimize iodine and reduce salt intake in Belgium.

References