Fluoride content of beverage drinks containing collagen

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Abstract

Objective: To determine the amount of fluoride in beverage drinks containing collagen.

Materials and methods: Twelve healthy beverage drinks containing collagen were used to measure fluoride by using fluoride electrode.

Results: The mean±SD fluoride content of the 12 beverage drinks was 0.107±0.015 mg/L with a range from 0.015 to 0.334 mg/L. The highest amount of fluoride content was B-ing collagen® (0.334 ± 0.110 mg/L) and the least fluoride content was Mansome® (0.015 ± 0.001 mg/L).

Conclusion: The beverage drinks containing collagen available in Bangkok, Thailand contain a differing concentration of fluoride, but within a safe range for consumption without acute and chronic fluoride toxicity.

Key words: beverage, collagen, drinking water, fluoride, toxicity, Thailand

Introduction

In the present, most of Thai people are focused on their health care by exercising and eating a healthy diet, including supplements that aim to provide a healthy and beauty. It causes the development of food products and beverages. As a result, many health and beauty products begin to have the role in the Thai society. Collagen drink is the one of health and beauty drinks that has become very popular as a way of replenishing the body with this vital ingredient. This is a reason a lot of people are now including collagen drinks and other sorts of collagen supplements to their daily diet. One of the key ingredients is a collagen peptide which is a high purity natural bioactive product, supplied in a form which can easily be used and digested by the human body, as was shown by scientific analysis. This drink is one of the products that contain fluoride as a component. The fluoride is naturally beneficial and may cause toxicity if consumed in excessive quantities.

Fluoride is an important for bones and teeth by stimulating the growth and strength including the prevention of tooth decay. Fluoride not only brings benefits but it also causes tooth enamel with white or brown or enamel cracking (dental fluorosis) if given the too much high volume of fluoride. It also affects the bones, causing conditions fluoride toxicity bones (skeletal fluorosis) and causes bone abnormalities such as leg movement difficult, pain or disability clause.

Fluoride’s adverse effects depend on total fluoride dosage from all sources. In 2015, recommended fluoride levels in the United States were changed to 0.7 ppm from 0.7-1.2 ppm to reduce the risk of dental fluorosis. Long term consumption of water containing excessive amounts of fluoride can lead to fluorosis of the teeth and bones. Many Studies have shown that major of the Kidney diseases have a great inclination of toxicity of fluoride. Long term consumption of excessive fluoride level, various disease such as osteoporosis, arthritis, brittle bones, cancer, infertility, brain damage, Alzheimer syndrome, and thyroid disorder can occur. Fluoride can be found in the general environment. The fluoride in the water will have an impact on health than any other sources. Especially in tropical regions such as Thailand that people consumed in relatively high volume of water that will have a chance to get fluodore into the high volume.

The previous studies of the fluoride content in beverage drinks such as soft drinks ready-to-drink green tea and fruit juices in Thai market had varied in each product. Sales of beverage drinks containing collagen have increased and different types and brands of beverage drinks are available in Bangkok supermarkets. There have never been reports about fluoride content of beverage drinks containing collagen in Thailand. The objective of this research was to measure the fluoride content of the beverage drinks containing collagen.

Materials and Methods

Twelve randomly selected commercial brands of beverage drinks containing collagen were obtained from supermarkets in Bangkok, Thailand. Five bottles of each brand, each with a different batch number were purchased. All bottles were stored in their original closed plastic containers at room temperature until the fluoride analysis was made. 10 ml. of each sample was added with TISAB III for buffer to maintain an appropriate ionic strength and pH and was measured using a fluoride-ion-selective electrode (Orion Model, Cambridge, MA, USA, 96-09). A set of standards containing 0.1, 1 and 10 ppm were prepared. Three readings were taken for each sample then the average was recorded. To assess the reliability of the method, one of five for each of the samples was
randomly selected and the samples were reanalyzed. Measurement of fluoride content were made in milligrams/L (mg/L) which is equivalent to parts per million (ppm).

Results
The concentrations of fluoride in the 12 different types of beverage drinks containing collagen are shown in Table 1 and figure 1. For each sample, the concentration is shown in mg/L. The mean±SD fluoride content of the 12 beverage drinks was 0.107±0.015 mg/L with a range from 0.015 to 0.334 mg/L. The highest amount of fluoride content was B-ing collagen® (0.334 ± 0.110 mg/L) and the least fluoride content was Mansome® (0.015 ± 0.001 mg/L). All beverage drinks per container had fluoride levels below 0.1 mg/L as shown in Table 2.

Discussion
The mean fluoride content in the beverage drinks containing collagen was 0.107 ± 0.015 mg/L. All beverage drinks per container had fluoride levels below 0.1 mg/L. For optimal dental health, the World Health Organization recommends a level of fluoride intake varies, depending on climate. The American Dental Association continues its endorsement of fluoridation of community water supplies in order to adjust the natural level of fluoride to a concentration sufficient to protect against tooth decay, a fluoride level 0.7 mg/L. Recommended the optimal level of fluoride content in the drinking water for warm countries like Thailand should be 0.5 ppm, due to the larger amount of water consumption in the hot climate compared to the temperate countries. Adverse effects become possible at fluoride levels far above this recommended dosage.

Acute ingestion of a large fluoride dose can provoke gastric and kidney disturbances, and can be lethal. Acute excess fluoride intake

<table>
<thead>
<tr>
<th>Product Company</th>
<th>Location</th>
<th>Type of collagen drinks</th>
<th>Fluoride concentration (mg/L) Mean ± S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toyo seikan (Thailand) CO., LTD. under control of The Red Bull Beverage CO., LTD.</td>
<td>Ayutthaya</td>
<td>Mansome®</td>
<td>0.015 ± 0.001</td>
</tr>
<tr>
<td>Sappe Public CO., LTD.</td>
<td>Pathum Thani Bangkok Bangkok</td>
<td>Beauti Drink® Beauti Shot® St.Anna®</td>
<td>0.020 ± 0.001 0.092 ± 0.001 0.048 ± 0.004</td>
</tr>
<tr>
<td>General Beverage CO., LTD. under control of Singha Corporation CO., LTD.</td>
<td>Nakhon Pathom</td>
<td>B-ing collagen®</td>
<td>0.334 ± 0.001</td>
</tr>
<tr>
<td>Pan Siam Food Products CO., LTD. under control of T.C. Natural CO., LTD.</td>
<td>Samut Prakan Samut Prakan Samut Prakan Samut Prakan</td>
<td>Bee Water® lemon flavor Bee Water® apple flavor Blink® CoQ10 Blink® Collagen Pink®</td>
<td>0.056 ± 0.003 0.026 ± 0.0003 0.105 ± 0.025 0.332 ± 0.110 0.050 ± 0.003</td>
</tr>
<tr>
<td>Besta international CO., LTD. under control of Dr. Tobi CO., LTD.</td>
<td>Prachinburi</td>
<td>Dr. Tobicolly® Lychee flavor</td>
<td>0.127 ± 0.022</td>
</tr>
<tr>
<td>Chokemachail Beverage CO., LTD. under control of Dr. Tobi CO., LTD.</td>
<td>Samut Sakhon</td>
<td>Dr. Tobicolly® Strawberry flavor</td>
<td>0.113 ± 0.012</td>
</tr>
</tbody>
</table>
Table 2  Fluoride content of beverage drinks in mg/L and mg per container

<table>
<thead>
<tr>
<th>Product Company</th>
<th>Type of collagen drinks</th>
<th>Fluoride content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>mg/L</td>
</tr>
<tr>
<td>Toyo seikan (Thailand) CO., LTD. under control of The Red Bull Beverage CO., LTD.</td>
<td>Mansome® (450 ml)</td>
<td>0.015</td>
</tr>
<tr>
<td>Sappe Public CO., LTD.</td>
<td>Beauti Drink® (360 ml)</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>Beauti Shot® (50 ml)</td>
<td>0.092</td>
</tr>
<tr>
<td></td>
<td>St.Anna® (180 ml)</td>
<td>0.048</td>
</tr>
<tr>
<td>General Beverage CO., LTD. under control of Singha CO., LTD.</td>
<td>B-ing collagen® (350 ml)</td>
<td>0.334</td>
</tr>
<tr>
<td>Pan Siam Food Products CO., LTD. under control of T.C. Natural CO., LTD.</td>
<td>Bee Water® lemon flavor (300 ml)</td>
<td>0.056</td>
</tr>
<tr>
<td></td>
<td>Bee Water® apple flavor (300 ml)</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>Blink® CoQ10 (50 ml)</td>
<td>0.105</td>
</tr>
<tr>
<td></td>
<td>Blink® Collagen (50 ml)</td>
<td>0.332</td>
</tr>
<tr>
<td></td>
<td>Pink® (100 ml)</td>
<td>0.050</td>
</tr>
<tr>
<td>Besta international CO., LTD. under control of Dr.Tobi CO., LTD.</td>
<td>Dr.Tobicolly® Lychee flavor (120 ml)</td>
<td>0.127</td>
</tr>
<tr>
<td>Chokemahachail Beverage CO., LTD. under control of Dr.Tobi CO., LTD.</td>
<td>Dr.Tobicolly® Strawberry flavor (120 ml)</td>
<td>0.113</td>
</tr>
</tbody>
</table>

Figure 1  Fluoride content (mg/L) of beverage drinks containing collagen are shown in Bar chart
interferes with calcium metabolism and many enzyme activities, and can be fatal with doses of 5-10 g in adults and 500 mg in small children. Chronic high intake of fluoride increases the risk of bone fractures and of the development of skeletal fluorosis in adults. Skeletal fluorosis occurs after many years of excessive fluoride intake (10-20 mg/day). Based on data from many studies, the upper limit of fluoride intake for older children and adults was set at 0.12 mg/kg body weight per day or 5 and 7 mg/day for children and adolescents aged 9-14 and 15 years and older, respectively. Therefore, the fluoride content of all beverage drinks in this study found to be within the recommended fluoride level.

The fluoride content of beverage drinks containing collagen, each brand had a different fluoride value. It might be depended on various factors, including the water used and quantity of fruit and packing process. Manufacturing facilities of beverage drinks containing collagen were in different areas including Bangkok, Ayutthaya, Pathum Thani, Nakhon Pathom, Samut Sakon and Prachinburi province. Tangchareondee and colleagues reported the bottled water having fluoride more than 0.7 mg/L were found in Saraburi, Ratchaburi, Nakhon Pathom, Bangkok, Chiang Mai, Lamphun, Phayao, Chiang Mai, Mae Hongsong, Phitsanuluk, Samut Sakon, Samut Prakan, Ratchaburi, Nakhon Si Thammarat, Songkhla and Surat Thani province. The highest fluoride content of this study was produced by the manufacturer is located in Nakhon Pathom province.

The same manufacturer had the variation fluoride content of beverage drinks such as five beverage drinks from Pan Siam Food Products Co., Ltd. This variation of fluoride level of these drinks might be due to the type and amount of fruit used and collagen in each product. There are many potential sources variation in the fluoride content of fruit such as the type of soil in which the fruit was grown and contamination via fertilizers or air sources.

All samples were analyzed for fluoride using an Orion fluoride ion-specific electrode in conjunction with an ion analyzer using an acetate buffer system (TISAB). The ion selective electrode methods are simple to perform and have good precision and sufficiently sensitive. The method detects only free fluoride ions in solution. The fluoride selective electrode is used for the determination of fluoride in beverage drinks. Most of the fluoride in water is in the form of the free fluoride ion. The beverage drinks containing collagen in this study are more than 90 percent water (by volume). Therefore, the method in this study was for the analysis only free fluoride ions form in the solution.

Based on the results, beverage drinks containing collagen available in Bangkok, Thailand contain differing concentration of fluoride, but within a safe range for consumption without acute and chronic fluoride toxicity.

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Ethical approval: None (Laboratory study)

References


