

Study on the contents of bottled mineral water of various brands in Malaysia

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Abstract

Mineral water has become very popular and is a necessity in the present world that we live in. Today, in every part of the world people are using the bottled mineral water widely. The mineral water is produced by various companies using numerous names and brand with approval of the relevant authorities. In this paper, the contents of the five main brands of bottled mineral water namely “Spritzer”, “Ice Mountain”, “Bleu”, “Select” and “Cactus” as used in Malaysia is analyzed and presented. Comparison is made between these five brands to determine which of these brands is most suitable for daily consumption in terms of its advantages in its mineral content to our health. Based on the investigation, it was found that the “Spritzer” brand had greater advantage with an extra mineral called silica which is good for muscle and bones rebuilding. Conversely the other four brands did not have this mineral. A detailed comparison of mineral content of the “Ice Mountain” brand with the other four brands had been made and a conclusion was drawn. This study will benefit the Malaysian society in helping them make an informed decision on choosing the most suitable bottled mineral water for consumption in line with one’s health concerns these days.

Keywords: Mineral water, Brand, Minerals, Comparison, Volume

1. Introduction

Mineral water is water which has either natural or artificially added minerals. Further, there is also mineral water that is carbonated, a result due to natural processes. Most water has to be processed to reduce its mineral contents, and to remove any unwanted bacteria or chemicals. Mineral water is usually obtained from water source which are rich in some kind of mineral or that thought to be beneficial to one’s health [1]. Most mineral water contains more than one trace of mineral either in a greater or lesser percentage. These mineral components vary widely, but might include iron, magnesium, calcium, or zinc, a very short list of the various chemical compounds[2]. Mineral water, no matter where it comes from or what minerals make it up, is an excellent addition to a healthy diet and exercise program as it will not only keep you hydrated, but also replace minerals that you lose through the normal course of your day[3]. There are ten natural benefits of drinking mineral water daily, among them the mineral water keeps the skin healthy, promotes proper digestion, enhances kidney functions, smooth the liver function, good immune system, proper blood circulation, better performance of the brain, helps detoxification, reproduces energy lost and acts as lubricants for joints in our body. There are two types of natural mineral water, traditional mineral water and sparkling mineral water[4]. Sparkling mineral water, unlike sparkling water, does not contain added carbonation. What mineral water is “made of” is another important question to ask when one is deciding whether or not it can be beneficial to one’s health. The fact is that there is a long list of different minerals that may be present in mineral water that could be potentially beneficial to your health. These different types of minerals might include the following: calcium, magnesium, zinc, iron, sodium, potassium, chloride, nitrates, sulphates, fluoride and even bicarbonates[5]. The type of minerals found in the mineral water you are drinking will depend on the source of the water[6].

There are a great number of benefits that could be gained from drinking mineral water. The minerals contained in this kind of water provide a number of therapeutic advantages. One way to attain optimum development of the body is by taking in the essential vitamins and minerals. One important advantage of drinking mineral water is that, it can help detoxify one’s body [7]. Drinking mineral water is important in eliminating the toxins that may have entered the body through the food that one eats every day and through the air that one breathes. Mineral water can also help in preventing problems related to the nervous system. It aids in heightening the body’s natural healing capability. The magnesium contained in mineral water contributes to making the bones and muscles strong, aids in making the body relax and in sustaining the proper blood pressure, and enhances the immune system of the body. Mineral water

works at promoting proper digestion and nutrient absorption. The minerals contained in mineral water such as chlorides and bicarbonates are important in promoting proper digestion as well as the effective regulation of the stomach and intestinal acids.

2. Methodology

In this research, comparison methodology is used. The five most popular mineral water brands (600ml) available in the Malaysian market had been chosen. The label for each brand had been removed and a comparative study of the contents for each brand was made. Table 1 represents the type of mineral contents and the amount added for each brands. A comparison was done (refer to figure 1) by comparing one brand with the others. Based on the comparative study result, the findings were that the “Ice Mountain” brand has large amount of mineral in each category of minerals. Due to this, this brand was chosen as a cross reference with other brands to analysis the volume comparison between minerals in each brand, refer to table 2. The outcome of the comparative study allows us to recommend the most suitable type of bottled mineral water for daily consumption in term of health concerns.

3. Result and Discussion

Mineral water contains commonly known vitamins and minerals [8], as well as unfamiliar components. Mineral water contains sodium which ones’ body needs to exert energy. The more the activity, the more sodium one needs. Sulphates are the salts of the sodium, which according to Fine Waters help the liver in detoxifying poisons from the system. It also helps digestion and stimulates the gall bladder. Too much sulphate, however, can act like a laxative, thus one should monitor this intake. Calcium and magnesium are other nutrients that are dissolved in mineral water. A person needs around 800 mg a day of calcium to keep the bones strong and to prevent osteoporosis. Magnesium works with calcium to provide energy producing enzymes that stimulate and coordinate muscle and nerve interaction. Individuals may feel dizzy, nervous or have throbbing headaches when one lacks magnesium. Fluorine is another trace mineral that provides nutrients to keep bones and teeth healthy. Commonly known as fluoride, this mineral keeps teeth and bones strong, and aids in preventing bone and gum infection. As with sulphate, too much of fluorine has a negative effect on humans [9]. Presence of larger quantities of fluorine would be toxic. Mineral water can also strengthen the heart. A study done in the European Journal of Clinical Medicine[5] found that adding folic acid and other vitamins to mineral water decreases the risk of cardiovascular disease. Other elements in mineral water include silica and potassium. These elements help the heart function and reduce heart disease. Silicic acids may be formed by acidification of silicate salts (such as sodium silicate) in aqueous solution. When heated they lose water to form silica gel, an active form of silicon dioxide. Orthosilicic acid (H_4SiO_4 , $pK_{a1}=9.84$, $pK_{a2}=13.2$ at 25 °C) [10] is the form predominantly absorbed by humans and is found in numerous tissues including bone, tendons, aorta, liver and kidney. The contents of each mineral water brands have been recorded in Table 1. Based on the table, there are almost 8 minerals that had been added into bottled mineral water. Most of the brands have 8 minerals but only one brand, “Spritzer” had an additional mineral known as silica. The “Ice Mountain” brand contains high minerals in terms of the volume when compared with the other four brands.

Based on the data obtained in this study the “Ice Mountain” brand had been used as references for comparing the volume of the minerals against the other four brands of bottled mineral water. Table 2 shows the comparison of volume added minerals for each brand in comparison to the “Ice Mountain” brand. The negative sign in table 2 indicates insufficient volume of mineral compare with the “Ice Mountain” Brand. There is only one positive sign that indicates there is added mineral in which the “Ice Mountain” brand does not contain this mineral. The neutral sign in table 2 indicates the volume of minerals of a particular brand is in surplus compared to the “Ice Mountain” brand. From the observation, it is clear the “Ice Mountain” brand contains better volume of minerals in term of the daily minerals needs when compared with the other four brands of Spritzer, Cactus, Bleu and Select.

However, based on the daily needs for human being consumption, the content of Sulphade and fluoride is slightly higher in “Ice Mountain” compare to other four brands. The rest of the amount of minerals is almost the same with slight differences. Another important mineral such as silica which has Orthosilicic acid is the form predominantly absorbed by humans and is found in numerous tissues including bone, tendons, aorta, liver and kidney [11]. The only brand which contains this is the “Spritzer” bottled mineral water. This is an advantage for the “Spritzer” brand compare to the rest. It was found that the potassium, Sulphade, magnesium and fluoride volume in each brand were more or less the same. Minerals like calcium, bicarbonate, sodium and chloride were found to have different volumes. The volume of mineral contents in each brand was different. The differences were quiet wide. Minerals like calcium and magnesium the contents are almost an average for the four brands compared to the “Ice Mountain”

brand. Magnesium works with calcium to provide energy producing enzymes that stimulate and coordinate muscle and nerve interaction. The content of bicarbonate in “Select” is much lesser compare to all the other brands evaluated. Bicarbonate is a major element in our body. Secreted by the stomach, it is necessary for digestion. It has a prevention effect on dental cavities. In other aspect, sodium more balanced expect in the “Cactus” brand where it was lesser compare to the four brands. Lastly the chloride mineral in “Bleu” is much higher than the rest of the brands. Sodium is needed more for our daily activities, since the body needs to exert energy. The volume of chloride has to be at a minimum level in mineral water so that it only purifies the water contents.

4. Conclusion

From the analysis, by comparing each minerals volume by brand, the “Spritzer” brand is proven to be better when compared with the other four brands for daily life consumption. This is followed by the “Ice Mountain“, “Cactus”, “Bleu” and “Select” brand. The only differences between the “Spritzer” and “Ice Mountain” brand is the additional mineral known as silica which is good for muscle and bones rebuilding. .Apart from this brand, “Ice Mountain” brand produced better minerals in term of volume ,compare to the four other brands. Further analysis can be adopted for research by choosing another set of brands of mineral water available in the Malaysian market to concrete the findings of this study.

Acknowledgement

The authors would like to acknowledge and express their sincere appreciation to The Parents and Teachers Association of Tunku Azizah Primary School, Bandar Indera Mahkota, Kuantan, Pahang, Malaysia for supporting and funding the publication fee of this research.

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Table 1 : Mineral Comparison Chart for Various Mineral Water Brands

Average Mineral Composition	Brands of mineral water				
	Spritzer	Ice Mountain	Bleu	Select	Cactus
Calcium	32 mg	40.8 mg	29 mg	32 mg	28 mg
Bicarbonate	125mg	150 mg	134 mg	125mg	112 mg
Sodium chloride	2.8 mg	17.8 mg	4 mg	2.8 mg	7.9 mg
Potassium	<1 mg	3.5 mg	10 mg	<1 mg	<1 mg
Sulphade	2.3 mg	1.7 mg	2 mg	2.3 mg	2.2 mg
Magnesium	<3 mg	6.0 mg	1 mg	<3 mg	<3 mg
Flouride	2.1 mg	7.5 mg	1 mg	2.1 mg	1.9 mg
Silicon(Orthosilicic acid)	<1 mg	1.1 mg	<1 mg	0	0
ph	35mg/l	0	0	0	0
Source	7.3	7.1	7.4	6.9	7.2
Price	Taiping,Perak	Lenggeng,N.S	Bangi,Selangor	Kota Tinggi,Johor	Taiping,Perak
	RM1.30/600ml	RM1.00/600ml	RM1.00/600ml	RM1.00/600ml	RM1.00/600ml

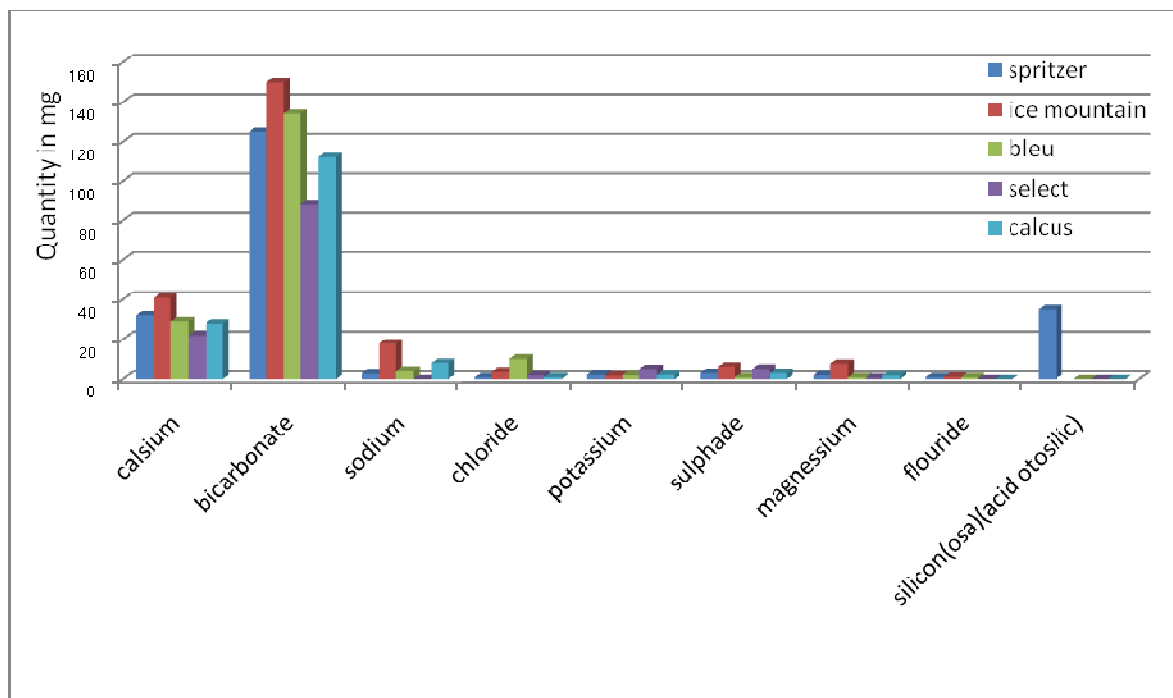


Figure 1 : Comparison in volume of minerals consume in each mineral water brands

Table 2: Table of volume on minerals by comparing to the “Ice Mountain” Brand

Minerals with comparison to “Ice Mountain” Brand	Spritzer	Cactus	Bleu	Select
Calcium	-8.8 mg	-12.8 mg	-11.8 mg	-18.8 mg
Bicarbonate	-25.0mg	-38.0 mg	-16.0 mg	-62.0 mg
Sodium	-15.8 mg	-9.9 mg	-13.8 mg	-17.8 mg
Chloride	-2.5 mg	-2.5 mg	6.5 mg	-1.5 mg
Potassium	0.6 mg	0.5 mg	0.3 mg	3.2 mg
Sulphade	-3.0 mg	-3.0 mg	-5.0 mg	-1.0 mg
Magnesium	-5.4 mg	-5.6 mg	-6.5 mg	-6.8 mg
Flouride	-0.1 mg	-1.1 mg	-0.1 mg	-1.1mg
Silica	+35.0 mg	0 mg	0 mg	0 mg

Note:

- Negative sign represent lesser content in term of volume of the mineral compare to “Ice Mountain” brand.
- Positive sign represent additional content of volume of the mineral compare to “Ice Mountain” brand.
- Neutral sign represent the content mineral is higher than in term of volume of the mineral compare to “Ice Mountain” brand.