

ORIGINAL ARTICLE

HEALTH BELIEFS ABOUT BOTTLED WATER AMONG DENTAL STUDENTS

Harpuneet Kaur, Sapanpuneet Kaur

BDS, Ex-graduate of National Dental College, Dera Bassi, Punjab, India


ABSTRACT:

Background: Safe drinking water is essential to humans and other life forms. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to adequate sanitation. Bottled water has been used in place of tap water. The study was conducted with the aim of knowing the Health Beliefs about bottled water among dental students. **Methods:** Multiple choice Questionnaire was prepared and distributed among the Dental students of National Dental College, Dera Bassi and Answers were collected and Analyzed. **Results:** Almost all the participants believed that Bottled water has additional health benefits as compared to Tap water and Minerals in Bottled water is the most selected option. Some participants believed that use of Bottled water relives symptoms of certain diseases .Maximum number of the Dental students think that bottled water has fewer impurities than Tap water. Some participants were of the opinion that it is not Eco friendly and were concerned with plastic packaging and say that it can be made Eco friendly if the bottle is made up of Biodegradable Materials. **Conclusion:** The majority of the participants believed that bottled water has some health benefit .The health beliefs were supported by various evidences. Participants also believed that bottled water Industry has a bad impact on the Environment.

Key words: Bottled water, Health beliefs, Dental students, Minerals, Diseases.

Corresponding author: Dr. Harpuneet Kaur, Sector 125, Greater Mohali, Punjab, India

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INTRODUCTION

Water is a transparent and nearly colorless chemical substance that is the main constituent of Earth's streams, lakes and oceans and the fluids of most living organisms. Water covers 71% of the Earth's surface .It is vital for all known forms of life. Safe drinking water is essential to humans and other lifeforms even though it provides no calories or organic nutrients. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to adequate sanitation .Bottled water has been used in place of tap water. The unavailability of clean drinking water, especially away from home, will be the biggest growth driver during the forecast period. ^[1] Growing health awareness and the rising risk of waterborne diseases will also facilitate growth.^[1] In addition , growth in the category is set to be the further supported by the drinking water shortages which prevail especially urban areas, making consumers move towards bulk drinking water^[1] demand for bottled water industry in India . The report covers fiscal years 2013 through 2018 rising safety and high hygiene awareness, following incidents of water borne diseases in major cities across India has boosted the growth of the packaged bottled water industry in

India. This exponential growth has amplified the per capita consumption of Bottled water to more than 20 liters, while it was only 4-5 liters in the late 1990's. ^[2]

METHODS

PARTICIPANTS: Data used for this study were collected from Dental Students of National Dental College, Dera Bassi, Punjab, India in December of 2016. The permission was taken from the Principal of the college, National Dental College. A Questionnaire was framed from the Article 'Health Beliefs about Bottled Water: A Qualitative Study' and was distributed in the college and a total of N=193 responses were gathered. The general sample characteristics area s follows: Undergraduates (186), Post Graduates (7).In addition, a substantial majority of the respondents were Males (33) compared to females (160).

PROCEDURE: The questionnaire was distributed among students and they were asked to select one or multiple options according to the questions asked, the questionnaire, generally about 20 questions varied in their content and wording according to the need. Participants were asked about their basic questions like Name, Sex, Address, Education and Source of drinking

water and why they primarily purchase bottled water and then questions on health beliefs about bottled water among Dental students. The questionnaire was then collected from the students and analyzed.

ANALYSIS OF SURVEY: The survey is analyzed statistically.

RESULTS

A total of 193 respondents were enrolled of the 193 participants, there were 160 females and 33 males; aged between 19 to 28 years and are currently living in Punjab, India. Respondent Education Characteristics are shown below in the Figure 1.

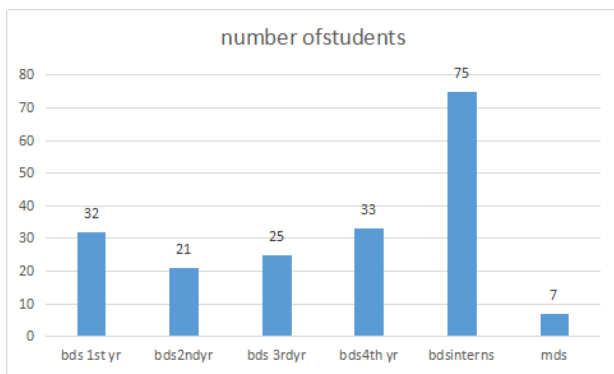


Figure 1: Showing education characteristics of the participants.

Overall, 5.60 % of participants use Bottled Water as their primary source of drinking water. As shown in Line Chart 2, 3.1% participants use Tap Water and 2% of the participants use River Water as the source of drinking water. Majority of the participants that is 91% of the participants use Filter Water.

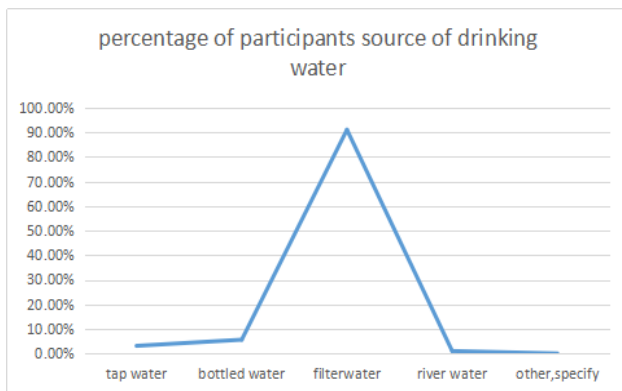


Figure 2: Line chart representing source of drinking water of the participants in percentage.

Majority of the participants that is 131 of 193 primarily purchase Bottled water during travelling, 15 participants use it in Functions and 52 participants use bottled water occasionally. Only 9 of the total use bottled water every day. One participant uses it for cooking purpose.

The graph below shows the choice of Brand used for Drinking Bottled Water.

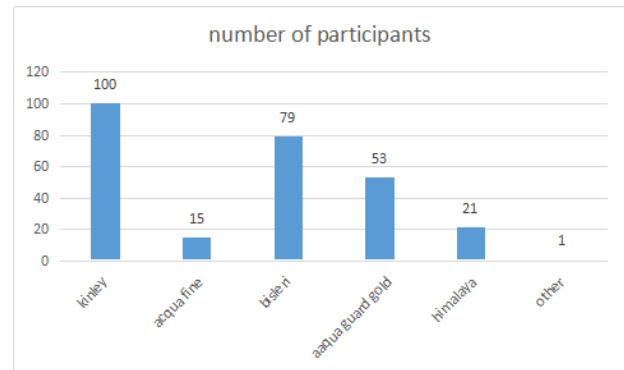


Figure 3: Bar chart depicting the choice of brands used by the participants for drinking bottled water.

HEALTH BELIEFS ABOUT BOTTLED WATER

Almost all the participants believed that bottled water has additional health benefits as compared to Tap water. A belief that the minerals in Bottled water conferred a health benefit was most commonly cited. Figure below provide a graphical presentation about the reasons for the health benefit of bottled water compared to Tap water.

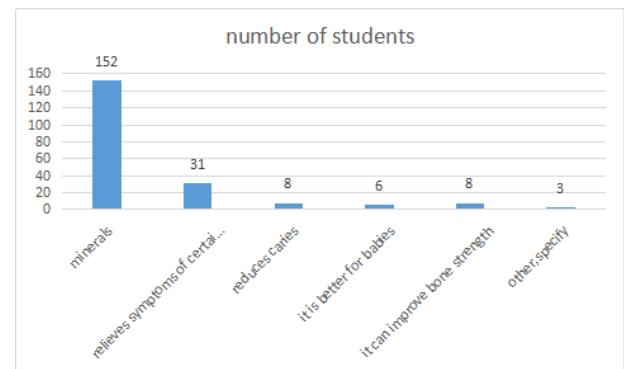


Figure 4: Bar chart provide a presentation about choices made by the participants about the reasons for the health benefit of bottled water compared to tap water.

One hundred fifty two Dental students think that minerals in bottled water provide the additional health benefit as compared to the Tap water. Thirty one participants believed that it relieves symptoms of certain diseases. Eight participants think that the use of bottled water reduces caries. Six participants believed that it is better for babies and 8 participants believed that it can improve bone strength. Three participants consider bottled water is safe. About 84.4% think that Bottled water has fewer impurities than Tap water. 76.6% people believed that bottled water is not detrimental to health. Eighty three participants said so because they think that it is clean as compared to tap water, 34 participants believed that it reduces the incidence of Diseases and 47 participants believed that it has appropriate amount of minerals which is good for our health. Twenty students think that bottled water is detrimental to health because of the repeated refilling of empty bottles with tap water rather than clean water, 17 says it is detrimental because of the actual

process of Refilling it in the Plastic bottles and 8 says that it can cause developmental and fertility defects because of plastic.69.9% of participants believed that it is not Eco friendly to use Bottled water and 21 participants expressed concerns about bottled water ‘s ‘Carbon Footprint’.

STATISTICS	RESPONSES	MEAN /%
1) Do you think bottled water has fewer impurities than tap water ?	1=yes 0=no	84.4% 15.5%
2) Is Drinking Bottled Water is detrimental to health?	1=yes 0=no	23.3% 76.6%
3) Do you think Bottled Water is Eco Friendly ?	1=yes 0=no	30.05% 69.9%
4) Are you satisfied with the Quality of Tap water supply in your locality and that it would not pose any adverse risk to their Health?	1=yes 0= no	32.6% 67.3%
5) Do you think Tap water is subjected to more stringent testing than bottled water?	1=yes 0=no	35.7% 64.2%
6) Do you think Bottled water is free from Microorganisms ?	1=yes 0=no	59.5% 40.4%

One hundred and thirteen participants are concerned with plastic packaging. Forty four students say that it can be made Eco friendly if bottle is made up of Biodegradable material and 12 believed if we are using paper bottle, then it is Ecofriendly. Three participants believed that if the bottle is made by such a process that it degrades by itself, then it is Ecofriendly. 67.3% students are not satisfied with the quality of Tap water supply in their locality and believe that it would pose adverse risk to their health and 64.2% students believed that Tap water is not subjected to more stringent testing than Bottled water .59.5% believed that Bottled water is free from microorganisms.

Motivating Factors: Figure below depicts the choices made by participants in Regards to Motivating factors.

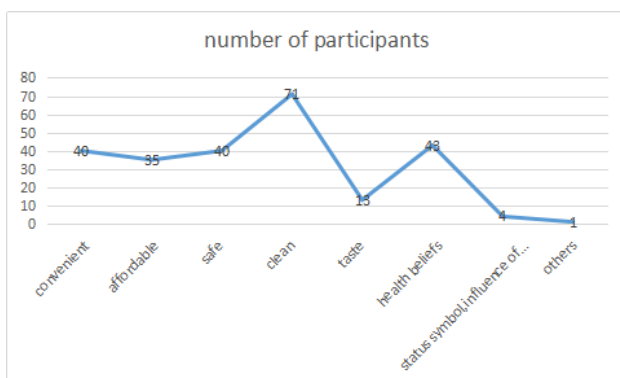


Figure 5: Line graph showing the choices made by the participants in regards to motivating factors

DISCUSSION

This study found that most people did hold health belief about bottled water, but that in the majority of cases these health beliefs were not strong motivating factors for purchasing bottled water. Other factors such as cleanliness emerged as far more important reason for any preference for bottled water.

Clean was a major motivating factor for buying bottled water. Kinley is the most popular brand and is mostly used by the students. This is inconsistent with the article [3], published by Most Inside, where Bisleri is considered the most popular brand and Kinley stands on the 2nd place; whereas in our study Bisleri stands on the 2nd place.

Most of the participants felt that bottled water had an increased mineral content compared to Tap water and that this conferred a health benefit. A study done by Babaj P et al.[4] compared the mineral content of various bottled water brand and found that there is difference of mineral contents in the different brands of bottled water. However the difference is very little. However the study done by Azoulay A et al [5] showed that the bottled water in North America and Europe contains more mineral content than tap water. It is also important to remember that these minerals can be obtained from other sources in the diet, so the health benefit of mineral contained in bottled water are not exclusive to this source. Some participants believed that it relieves symptoms of certain diseases. England C et al[6], stated that silicon rich mineral water helps to protect the body against the toxicity of aluminum and reduces the incidence of Alzheimer disease. Some participants mentioned that they felt that bottled water was especially beneficial for babies. It is suggested that choosing a mineral water with low Na content may be useful in preparing formula milk because a Hyperosmolar diet has been linked to hypertension and obesity in later life.[7] Some participants believed that bottled water reduce caries. It is true as in the article [8] published in orthodontic products, it is stated that the bottled water rich in Fluoride helps prevention of caries. Some students were of the opinion that it can improve Bone strength which is in consistent to the article published by Burckhant P. [9] who stated that some mineral water contains minerals in such high concentration that they can influence bone health when consumed regularly. Calcium from mineral water is rapidly absorbed inhibit PTH secretion and bone resorption on the short as well as on the long term.

Most of the participants believed that Bottled water has fewer impurities than tap water , but the study conducted in the United States states that bottled water is no purer than tap water.[9] In another article [10] published in Indian Express, stated that from safety and price perspective , tap water is better for people.

A number of participants express concerns about a link between the plastic container of bottled water and cancer. A carcinogenic substance known as DEHA (di-ethy hexyl adipate) is indeed used in the manufacture of PET (poly ethylene terephthalate), a plastic used to manufacture most bottled water containers. [11]However,

laboratory studies performed by the US Environmental Protection Agency concluded that leaching of DEHA from the bottle is not harmful to human health.^[12] Although not true, the concerns, held by participants about the plastic bottles are not irrational and replicate concerns that other people seem to have. For example, in 2004, a hoarse-email circulated in the USA, attributed to Johns Hopkins University, suggesting that the plastic used to manufacture the containers for bottled water contained harmful dioxins, which is untrue.^[13] Most of the participants believed that bottled water is nothing but a bottled tap water which is also stated in the article published in the 'Mercola' ^[14] and this article stated the dangers of plastic used in the making of the Bottles. But maximum students believed that bottled water is not detrimental to health as it is clean as compared to tap water. Solvie Karlstrwi, published a report in National Geographic.com, stating that 2008 investigation by the Non-Profit Environmental working group found some bottled water is sullied with untested industrial chemical and may not necessarily be cleaner than tap water.^[15] Maximum of the participants expressed concerns over the environmental impact of bottled water. These concern included comments about the plastic packaging and about the carbon footprint created by the transport of imported bottled water. The environmental impact of the plastic bottles is also discussed in the article.^[14] Packaging is generally made from plastic, either poly-vinylchloride (PVC) or PET. The latter is becoming widely used as it is easier to recycle than PVC and does not release chlorine when burnt. Most of the participants are not satisfied with the quality of tap water supply in their locality and believed that it can pose adverse risk to their health and maximum of the participants believed that tap water is not subjected to more stringent testing than bottled water which is totally opposite fact stated in the article ^[16] published in Medical daily which said that pricey bottled water is subjected to far less stringent testing than tap water. Bottled water is only required to do monthly testing at source and water coming from UK taps is the most stringently tested in the world. In the study conducted in some cities of India.^[17] The Pune tap water and Pimpri -Chinchwad had zero contamination while Mumbai's Tap water was the worst among those 22 cities. Most of the participants believed that bottled water is free from microorganisms but it is inconsistent to the article published in 'The Hindu' which said that almost all brand label their products as 'germ free' and 'bacteria free'. But the fact is something different. No brand was free from bacteria though all were found to be Non-pathogenic.^[18]

CONCLUSION

From the study it is concluded that almost all the participants think that Bottled water has additional Health benefits than Tap water and it can relieve some disease's symptoms which is supported by evidence to varying extents. Participants also believed that bottled water Industry has impact on the Environment and it is also supported by various evidences.

Clean, Health benefits and Safety are the motivating factors when deciding whether to buy a bottled water or not.

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REFERENCES

1. Bottled water in India: Euromonitor International. March 2016. [<http://www.euromonitor.com/bottled-water-in-india/report>]
2. Packaged Bottled Water Market in India 2013-18: Value Notes. [<http://www.valuenotes.biz/insights-publications/publications/packaged-bottled-water-market-in-india-2013-18/>]
3. Best Mineral Water Brand in India? : Most Inside. July 4, 2016. [<http://www.mostinside.com/best-mineral-water-brand-in-india/>]
4. Babaji P, Shashikiran NN, Reddy SV. Comparative evaluation of trace elements and residual bacterial content of different brands of bottled water. J Indian Soc Pedo Prev Dent 2004;22(4): 202-3.
5. Azoulay A, Garzon P, Eisenberg J. Comparison of the mineral content of tap water and bottled waters. J Gen Intern Med. 2001;16:168-75.
6. England.C :Mineral Water Found to Reduce the Symptoms of Alzheimer's Disease and Vaccine Injury is Boycotted by Supermarkets .GreenMedinfo.August 14th 2016.
7. Petraccia.L,Liberati.G, Masciullo.S,Grassi.M, Fraioli.A :Water, mineral waters and health. Clinical Nutrition 2006;25: 377-85.
8. Does Bottled Water with Fluoride Reduce Caries Risk?:Orthodontics Products.october 30, 2006. [<http://www.orthodonticproductsonline.com/2006/10/does-bottle-d-water-with-fluoride-reduce-caries-risk-2006-10-30-01/>]
9. Paddock.C:Bottled Water No Purer Than Tap Water.Medical NewsToday.16 october,2008.
10. Bottled water 'less safe' than tap water: study :The Indian Express .Jan 02 2013. [<http://archive.indianexpress.com/news/bottled-water-less-safe-than-tap-water-study/1053405/2>]
11. Leising L, McCarthy P, Hahn T, Dunford L, McKernon M. Bottled Water Myths: Separating Fact from Fiction. Practical Gastroenterology 2007; 31: 89-93.
12. U.S. Environmental Protection Agency: Di-(2-ethylhexyl) Adipate; Toxic Chemical Release Reporting. Federal Register. 1995, 60: 39132-39134.
13. Researcher Dispels Myth of Dioxins and Plastic Water Bottles :Johns Hopkins Bloomberg School of Public Health news:June 24, 2004 [<http://www.jhsph.edu/news/stories/2004/halden-dioxins-two.html>]
14. Dr. Mercola:Bottled Water Poisons Your Body One Swallow at a Time:Mercola. January15,2011. [<http://articles.mercola.com/sites/articles/archive/2011/01/15/dangers-of-drinking-water-from-a-plastic-bottle.aspx>]
15. Karlstrom .S, Dell'Amore.C. Why Tap Water is Better Than Bottled Water :National Geographic :March 13,2010 [<http://news.nationalgeographic.com/news/2010/03/100310/why-tap-water-is-better/>]
16. Hsu.C:Bottled Water May Be 'Less Safe' Than Tap Water :Medical Daily :January 2 , 2013.
17. Testing the Taste of India's Drinking Water: knowhowledge.com [<http://knowhowledge.com/website/staticpages/News-articles/Indiawater/tindiawater1ep.asp>]
18. Muralidharan.Y: How safe is bottled water? The Hindu: February17, 2013 [<http://www.thehindu.com/thehindu/mp/2003/02/17/stories/2003021701620200.htm>]

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