



Comparative Study of Presence of Heavy Metals in Randomly Selected Softdrinks of Patna

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Abstract : *This study reports the presence of heavy metals in randomly selected soft drinks from local market of Patna (district Bihar) at a concentration above the limit specified by the World Health Organization (WHO) for food and drink products in India. This work has been designed to compare the levels of lead, cadmium, chromium and copper in selected Indian soft drinks with the specified recommended limits by the world health organization. These heavy metals in selected Indian soft drinks were estimated by Atomic Absorption spectrophotometer after digestion of soft drinks with nitric acid.*

The result obtained showed that only copper content of the selected drinks was within the limit (except one sample)

while the limit failed for the remaining parameters i.e., lead, cadmium and chromium.

Keywords: *Soft drinks, WHO, AAS, heavy metals.*

Introduction:

Soft drinks are sweetened water based non alcoholic beverages mostly with balanced acidity. The non alcoholic beverages include many drinks such as carbonated drinks, juices, energy drink, bottled water, coffee and tea. Carbonated drinks represent the highest portion of non –alcoholic consumed beverages.

Manufacturers of soft drinks should special attention to the purity and uniformity of ingredients, raw materials sources of water and packaging material which are actually the source of impurities in the drinks. The presence of metallic impurities in soft drinks can constitute health hazards to public (Bakare Olumola, 2005; Kreplio et al., 2005 ; Onianwa et al., 1999;). Obesity along with an increased risk of heart problems and diabetes are some of the most prominent health issues that are caused due to these drinks.

Water should be purified properly during the production process of soft drink because if not, then it

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can be the source of contamination by heavy metals which constitute a major threat to public health. A study has shown about the presence [and the migration] of metals in carbonated soft drinks that are kept in contact with different materials such as polyethylene terephthalate [PET], aluminium, steel and glass. It is important to remark that metallic cans are lined with a thin layer of a polymeric material 2 (Rexan Beverage Can Americas, 2004).

Generally, any effect of heavy metal toxicity should be considered with regards of their contaminant level goal [MCLG] and maximum contaminant level [MCL]. The MCL in milligram per litre of some heavy metals are:

METALLIC ION	MCL(mg/L)
Copper	1.3
Chromium	0.05
Cadmium	0.005
Lead	0.015

Objectives :

- Comparative study of presence of heavy metals in randomly selected soft drinks of Patna.
- The analysis is done to check the harmful effects of different heavy metals and to spread awareness among the people about these harmful effects so that they decrease the consumption of such drinks.

Hypothesis:

From literature survey it was found that if people consume sugary drinks on a regular basis than it may lead to belly fat accumulation.

Sugary drinks may not make us feel full and are strongly linked to weight gain.

Sugary soda may be addicted.

The sugars and acids in drinks may be a disaster for dental health.

Instrument Required: Atomic Absorption spectrophotometer and Digester.

Methodology:

1. Ten randomly selected soft drinks were collected from local market of Patna, district Bihar.

2. Five ml of each soft drinks was measured and transferred into clean beaker(50 ml).
3. To digest the samples 5 ml concentrated HNO₃ was added to the beaker.
4. Digestion was done at 60°C for two hours till the solution was reduced to half.
5. Solution was filtered into 100ml volumetric flask and distilled water was added up to the mark.
6. Standard of different metals (Pb, Cd, Cr and Cu) was diluted into respective dilution for calibration of AAS equipment.
7. Test sample was run for test on AAS.

Results and Discussion:

Consolidated Data of Heavy Metals Present in Soft Drinks:

SAMPLES	Pb(mg/L)	Cr(mg/L)	Cd(mg/L)	Cu(mg/L)
MOUNTAIN DEW	0.275	0.065	0.031	0.027
7 UP	0.406	0.960	0.038	0.028
SPRITE	0.333	0.165	0.034	0.044
SODA	0.325	0.084	0.030	0.115
THUMBS UP	0.389	0.058	0.030	0.059
LIMCA	0.389	0.027	0.033	0.055
APPY FIZZ	0.489	2.1	0.029	0.079
BIG	0.473	0.035	0.034	7.1
COCA COLA	0.507	0.059	0.029	0.035
FANTA	0.699	0.321	0.039	0.117
MCL	0.015	0.05	0.005	1.3

Lead:

The most common childhood problem of lead poisoning is central neurotoxicity³(T.I.Lidsky et al.,2003).Other symptoms of childhood lead toxicity include; anaemia, peripheral motor neuropathy, anorexia, vomiting, growth delay.

Cadmium:

Over a long period of intake, cadmium may accumulate in the kidney and liver because of its long biological half life and may lead to kidney damage 4 (J.Godt et al., 2006).

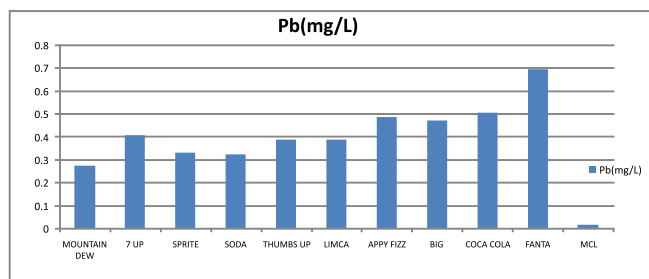
Chromium:

Mild symptoms: dizziness, general weakness, eye irritation. Severe symptoms: kidney, liver, gastrointestinal, cardiac, hematologic or reproduction disorders, growth problems, nasal perforation, corneal injury, abnormalities of teeth as discolouration and erosion.

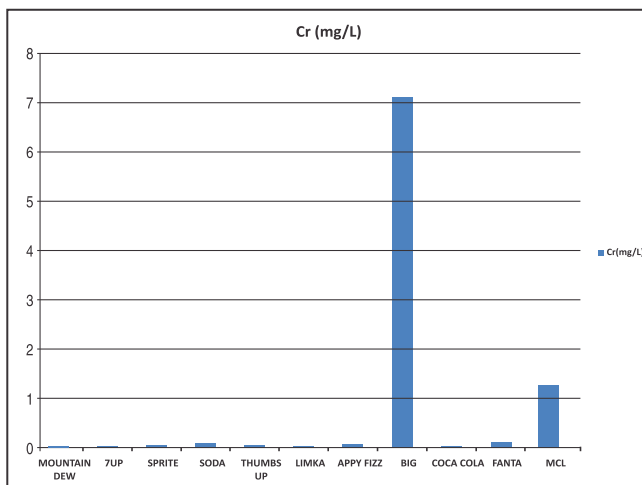
Copper:

Copper is also an integral part of the antioxidant enzyme and has a role in iron homeostasis. Copper is also an essential trace element for all biological organisms but too much copper can be toxic. Copper toxicity can lead to heart and kidney failure, linear damage, brain disease or disorder.

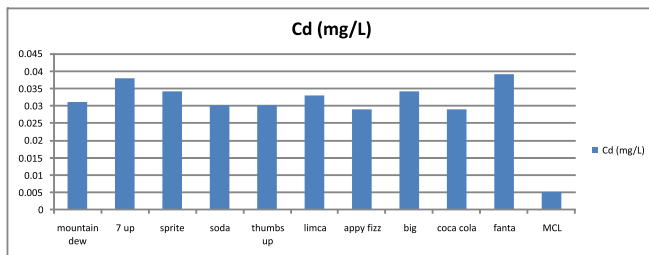
In almost all the samples chromium was present above the threshold level except few. Chromium was present in relatively high concentration in Appy Fizz (2.1), 7 up (0.960), Fanta (0.321) Sprite (0.165).



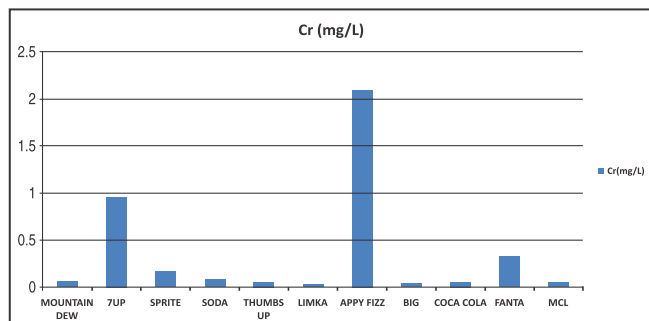
In all the samples lead was above the threshold level, especially in Fanta(0.699), Coca-Cola(0.507), Appy Fizz(0.489), 7 up(0.406) and big lead was present in relatively very high level.



In all the samples Cu was below the threshold level except Big (7.1). Big showed highest level of Cu.



In all the samples cadmium was present above the threshold level especially in Fanta(0.039), 7up(0.038), Sprite(0.034), and Big(0.034) cadmium was present in relatively high level.



Conclusion:

From our present study we can conclude that we should not consume these soft drinks on a regular basis because these are contaminated with heavy metals. From the ten sample we concluded that five sample i.e., Fanta, coca cola, Appy fizz, 7up and big are more contaminated by heavy metals as compared to the other five samples. People who consume such drinks on a regular basis must therefore take the ill effects into consideration.

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