

# FREQUENCY OF SIGNS/SYMPTOMS OF HYPOMAGNEAEMIA IN USERS OF FILTERED WATER AS COMPARED TO USERS OF TAP WATER

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## ABSTRACT

**Introduction:** Filtration of water lowers its magnesium level. Magnesium is important mineral used in over 300 enzymes and its deficiency leads to various diseases of nerves, muscles, mental and cardiovascular health. This study intended to compare symptoms of magnesium deficiency among users of filtered water and those using tap water in order to provide evidence that use of filtered water is causing magnesium deficiency symptoms and hence advocating magnesium supplementation.

**Methodology:** A cross sectional survey was conducted and 100 subjects were randomly selected from Lahore and were interviewed regarding their drinking water and data was collected regarding their sociodemographic status and presence of signs/symptoms of hypomagnesaemia namely occurrence of cramps, muscle twitching, fasciculation, tingling, numbness of different body parts, fatigue, irritability, seizures. Data was analysed in SPSS 20.

**Results:** Out of our sample of 100, mean age of the respondents was 26 +/-10years, 74 (74%). 28(28%) are working and 72(72%) are non-working. 50% were filtering water at home and 50% people used to drink water from filtration plants. 50% complained of muscle cramps in which 45(48%) people were using tap water and 8(6.5%) were using filter water. 35% experienced muscle twitching in which 29(33.3%) were people using tap water and 6(6.1%) were using filtered. 21(24%) people using filtered water felt tingling in comparison to 5 (38.4%) using tap water. 12 (13.7%) people who used filter water had seizures while 3(25%) people amongst those who used tap water. 38(43.6%) people using filtered water felt numbness in various body parts while 7 (53.8%) amongst users of tap water. 25(28%) people who used filtered water suffered insomnia as compared to 5(38%) people using tap water. 52% complains of irritability in which 6(46%) were using tap water and 45(51%) were using filtered water. 38% had irregular heartbeat from which 3(23%) were using tap water as compared to 42(48%) using filtered water.

**Conclusion:** Signs and symptoms of hypomagnesemia were not higher in people using filtered water.

**Keywords:** hypomagnesemia, filtered water,

## INTRODUCTION

Magnesium is important for normal body functions. It is a co-factor in more than 300 enzyme- catalyzed reactions, most importantly reactions forming and using ATP.<sup>1-3</sup> Normal magnesium levels are between 1.7—2.2 mg/dL. Levels less than 1.7 mg/dL define hypomagnesaemia.<sup>4</sup> Its deficiency in human body may lead to a wide spectrum of diseases and conditions such as osteoporosis, fibromyalgia, chronic fatigue syndrome, hypertension, diabetes, headaches, muscle cramps, asthma, eclampsia, arrhythmias and depression to name a few.<sup>5,6,7</sup> Spices, nuts, cereals, cocoa and vegetables are rich sources of magnesium.<sup>8</sup> Green leafy vegetables such as spinach are also rich in magnesium.<sup>8</sup>

In the U.S. the Recommended Dietary Allowances (RDAs) are 400 mg for men ages 19–30 and 420 mg for older; for women 310 mg for ages 19–30 and 320 mg for older.<sup>9</sup>

Serum magnesium levels may be normal even when intracellular magnesium is deficient. Diagnosing magnesium deficiency through laboratory test is not reliable. Ismail Y et al, concluded that serum magnesium levels may remain normal despite negative body stores. Also numerous studies have shown that magnesium deficiency is common and may be present in over 10% of hospitalized patients, as well as in the general population.<sup>10</sup>

Tics, muscle spasms and cramps, seizures, anxiety, and irregular heart rhythms are among the classic signs and symptoms of low magnesium. Latent or sub clinical symptoms include include migraine headaches, insomnia, depression, and chronic fatigue, among others.<sup>11-13</sup>

Drinking water is also a source of magnesium. In a study conducted in Spain, results showed that bottled water contained Mg++ between 0.1-128 mg/L and tap water contained Mg++ between 0.3-315 mg/L.<sup>14</sup>

In Surat, India researchers found that serum magnesium was significantly lower in the population who were consuming filtered water compared to those drinking non-filtered water ( $p<0.05$ ).they also concluded that filtration removed much of the needed calcium and magnesium.<sup>15</sup>

Use of filtered water is widely advocated in prevention of water transmitted diseases. On the other hand filtration is causing decrease in magnesium levels. This study intended to compare symptoms of magnesium deficiency among users of filtered water n those using tap water in order to provide evidence that use of filtered water is causing magnesium deficiency symptoms and hence advocating magnesium supplementation.

## METHODOLOGY

A cross sectional survey was conducted and 100 subjects were randomly selected from Lahore and were interviewed regarding their drinking water and data was collected regarding their socioeconomic status and presence of symptoms of hypomagnesaemia namely

occurrence of cramps, muscle twitching, fasciculation, tingling, numbness of different body parts, fatigue, irritability, seizures. Data was analysed in SPSS 20.

## RESULTS

Out of our sample of 100, mean age of the respondents was 26 +/-10years,74( 74%) were female and 26(26%) were male. 28(28%) are working and 72(72%) are non-working, 23(23%) are married and 77(77%) are unmarried, 2(2%) illiterate and 98(98%) are literate. 87% were using filtered water,13% were using tap water. 50% were filtering water at home and 50% people used to drink water from filtration plants. According to our research, 41% people fatigue from which 8(61.5%) were using tap water and 32(37%) were using filtered water. 50(50%) complain of muscle cramps in which 45(48%) people were using tap water and 8(61.5%) were using filter water. 35% experienced muscle twitching in which 29(33.3%) were people using tap water and 6(46.1%) were using filtered.

**Table 1:** Sociodemographic characteristics n=100

Characteristic	Catagory	Frequency	Percentage
Gender	Male	26	26%
	female	74	74%
Education	illiterate	2	2%
	literate	98	98%
Marital status	married	23	23%
	unmarried	77	77%
Type of drinking water	filtered	87	87%
	tap	13	13%

**Table 2:** Frequency of signs and symptoms of hypomagnesaemia in users of filtered water and tap water n=100

Signs and symptoms of hypomagnesemia	Frequency in Users of Filtered water(percentage)	Frequency in Users of tap watern (percentage)
fatigue	32(37%)	8(61.5%)
Muscle cramps	41(45%)	8(61.5%)
Muscle twitching	30(35%)	29(33.3%)
Tingling	21(24%)	5(38.5%)
Seizure	12 (13.7%)	3(25%)
Numbness	38(43.6%)	7(53.8%)
Irregular heart heat	42(48%)	3(23%)
Mood irritatbility	45(51%)	6(46%)
Insomnia	25(28%)	5(38%)

21(24%) people using filtered water felt tingling in comparison to 5 (38.4%) using tap water.12 (13.7%)people who used filter water had seizures while 3(25%) people amongst those who used tap

water.38(43.6%) people using filtered water felt numbness in various body parts while 7 (53.8%)amongst users of tap water. 25(28%) people who used filtered water suffered insomnia as compared

to 5(38%) people using tap water. 52% complains of irritability in which 6(46%) were using tap water and 45(51%) were using filtered water. 38% had irregular heartbeat from which 3(23%) were using tap water as compared to 42(48%) using filtered water.

## DISCUSSIONS

Magnesium is an important mineral in the body with various disease implication in case of its deficiency. Magnesium from drinking water is about 10% of recommended daily value. This study intended to find out the symptoms of hypomagnesaemia among users of filter water as compared to tap water. Evidence yielded by study done in Surat India denoted significantly lower serum levels in subjects using filtered water as compared to those using tap water but it does not comment on the presence of symptoms of hypomagnesaemia.<sup>15</sup> Likewise a study conducted in Spain also says a lower level of magnesium levels in filtered/bottled water in comparison to tap water. It has been already discussed previously that serum magnesium level is not a good indicator of negative magnesium stores in the body.<sup>14</sup> Thus this study probed into the magnesium levels in the body indirectly via the presence of symptoms of hypomagnesaemia in filtered water users and in tap water users. However the study results did not indicate that the users of filtered water have more symptoms of hypomagnesaemia rather all the symptoms were found more in users of tap water. Hence the results of our study do not validate this hypothesis that use of filtered water may lead to clinical symptoms of hypomagnesaemia. However smaller size and lack of matching and homogenous comparison group are limitations and which required further research on this issue to further negate or accept the hypothesis.

## CONCLUSION

Despite the evidence from the literature regarding lower magnesium levels in filtered water and lower serum magnesium levels in consumers of filtered water our study failed to demonstrate higher frequency of symptoms of hypomagnesaemia among users of filtered water.

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