



EFFECTS OF EXPOSURE TO SOLID MAGNETIC FIELD ON QUALITY OF WATER - A SCIENTIFIC REPORT

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ABSTRACT

Background: Magnetic or magnetised water is a commonly used form of magneto therapy. In this, the water is charged by treating it in the magnetic field by which the water acquires the magnetic properties and that is used for therapeutic purpose. Although many properties of water that get influenced by magnetic force have been reported in lot of studies, the aim of this work is specifically to investigate the effect of magnetic force on the qualities of water. We studied the pH, iron concentrations like Calcium, Sulphate, Iron, Fluoride, nitrate, specific gravity and viscosity. **Methodology:** Deep bore well source was used to take two litres of water. These two litres of water was split into two samples A and B of one litre each. Sample 'A' was used for

magnetisation and sample B was kept as such. Sample A was magnetised by bipolar method using two magnets for 24 hours in a well ventilated room under normal room temperature. Sample B was placed in the same room setting without the magnets. After 24 hours, the two samples were tested to find the quality. **Results:** The magnetised water has significant change in the quality of water compared to the normal unexposed water. The pH, Calcium, Sulphate, Iron and fluoride ion concentration showed considerable raise in magnetised water compared to normal water. **Conclusion:** In this study, we found that the pH, ion concentrations like Calcium, Sulphate, Iron, Fluoride, nitrate, specific gravity and viscosity of magnetic water increased after magnetization. This work can be extended to examine the effect of these changes in magnetic water on Treatment and prevention of diseases.

KEYWORDS: Magnetism, Magnetic water, Quality of water.

INTRODUCTION

Magnetic force has been one of the mysteries of life, playing a versatile role in the arrangement of all atoms and molecules of matters irrespective of whether they are solid, liquid or gas.^[1] Magnetism is as old as earth itself with the magnetic properties spread throughout. The earth has magnetic lines of forces all around it like any magnet and transmitting the magnetic energy to all living beings. This enables the use of magnetism in the field of therapeutics and its benefits are numerous since ancient times. The therapy with magnet is known as Magneto therapy and it works on the basis of natural principles and laws. The magnetic waves produced in the body causes some desirable changes in the body that are beneficially used in ailments, pain management, preventive medicine and many more.^[2]

Magnetic or magnetised water is a commonly used form of magneto therapy. In this, the water is charged by treating it in the magnetic field by which the water acquires the magnetic properties and that is used for therapeutic purpose. Depending upon the magnetic charge it possess, the water emits its magnetic properties and accordingly it is used. It has many health benefits. The magnetised water increases the solubility of minerals and therefore improves the transfer and absorption of nutrients in the body. Numerous papers reported that the magnetic field (MF) could change the physicochemical properties of water since several decades.^[3] When water passing through a MF, it becomes magnetized water (MW). Han et al. investigated the optical properties of water according to which the water placed between two strong magnets showed changes in the infrared absorption property.^[4] Holysz et al. concluded MF could enhance the conductivity and decrease the surface tension of water^[2] while Wang et al. has examined the effect of a static MF on liquid or water using frictional experiments, the results suggested the friction coefficient was smaller in the MF.^[5] Cai et al. studied the effect of MF on the hydrogen bonds of water and discussed the mechanism of magnetization based on molecular dynamics simulation; experimental and theoretical models.^[6]

Although many properties of water that get influenced by MF have been reported already in lot of studies, only few works focussed on pH, ion concentration and viscosity of MW and these properties are very important in various applications of MW in metabolic conditions, pain management, Gastro intestinal disorders and psychological issues. The aim of this work is to investigate the effect of MF on these qualities of water; we studied the pH, ion

concentrations like Calcium, Sulphate, Iron, Fluoride, nitrate, specific gravity and viscosity. Moreover, influence of MF on magnetization effect is discussed.

METHODOLOGY

Deep bore well source was used to take two litres of water. These two litres of water was split into two samples A and B of one litre each. Each one litre was poured into a glass jar and covered with a wooden cap. Sample 'A' was used for magnetisation and sample B was kept as such.

Sample A was magnetised by bipolar method using two magnets. North Pole of one magnet and the south pole of another were placed on either side of the glass jar and left untouched for 24 hours in a well ventilated room under normal room temperature. Sample B was placed in the same room setting without the magnets.

After 24 hours, the two samples were taken to a Govt. Certified laboratory to test their quality. This lab works specifically for checking the water quality. There, the water was checked for any changes that were observed due to magnetisation. The lab is ISO standardised and has the accreditation certificate received from the National Accreditation Board for testing and calibration laboratories. Four parameters; pH, calcium, iron and viscosity of water was mainly checked to test its quality using the pH meter, EDTA complex metric titration, phenothroline photometric method and Ostwald meter respectively. Other parameters were also looked upon.

RESULTS

Table 1: Effects of Magnetization on Quality of water.

Parameters	Units	Normal Water	Magnetized water
PH (at 25 ⁰ c)		6.54	7.24
Calcium as Ca	mg/l	1.6	92.18
Sulphate as SO ₄	mg/l	BLQ(LOQ:5)	184.65
Fluoride	mg/l	BLQ(LOQ:0.05)	0.57
Nitrate as NO ₃	mg/l	1.02	3.8
Iron as Fe	mg/l	BLQ(LOQ:0.02)	0.49
Specific Gravity at 20 ⁰ C	g/ml	1	1.002
Viscosity	cP	0.891	0.897

The magnetised water has significant change in the quality of water compared to the normal unexposed water. The pH of magnetized water showed more alkalinity than normal water. Calcium iron concentration also increased several fold (92.18 vs 1.6) in MW than normal.

Sulphate iron concentration showed tremendous raise in magnetised water (184.65 vs BLQ). The limit of quantification of Iron and fluoride also increased to significant level in magnetized water.

DISCUSSION

Our experimental results suggest that MF have changed some physical qualities of water, including pH, ion concentrations like Calcium, Sulphate, Iron, Fluoride, nitrate, specific gravity and viscosity. No studies have been done before to evaluate the effects of MW on the quality of water. The studies done earlier have found that MW changes the physical properties of water such as specific heat, surface tension, evaporation amount and boiling point where as the water quality is determined by variables such as transparency, turbidity, water colour, pH, alkalinity, hardness and the content of carbon dioxide, unionized ammonia, nitrite, and nitrate.^[7] Hence, solutions in water treatment are applied to improve water quality. The changes in physical and chemical properties of magnetized water can affect desirably on the biological system of an individual that consume the magnetic water such as the digestion, blood circulation, blood pressure, respiration, body temperature, which in turn affects the entire metabolic system. And pH affects the metabolism and other physiological processes of an individual.

Recently, the interest in magnetized water has increased along with the interest in the functionality of beverages. Magnetized water is hexagonal water obtained by passing water through specially manufactured permanent magnet that can activate and ionize water molecules to change its structure hexagonal, like water in our body. It has been known from drinking experiences and case reports that the magnetized water is effective in treating several chronic diseases including diabetes (caused by oxidative stress), but scientific experimental results are seldom reported. Among the efficacies of magnetized water, it was reported that magnetized water increased glutamate decarboxylase activity and reduced dental plaque.^[8] Some Chinese studies have shown the magnetized water to be effective in the treatment of urolithiasis and litholysis.^[9] In the recent preliminary studies, it showed that administration of magnetized water for at least 6 weeks suppressed the lymphocyte DNA damages in animals with DEN (diethyl nitrosamine)-induced cancer.^[10]

Ma et al.^[8a] presented the possibility that magnetized water can prevent aging and fatigue by increasing the cell membrane permeability. In addition, some clinical cases claim that it is effective in asthma, arthritis, diabetes, and obesity, but most of the results are not based on

solid science. Magnetized water has higher pH and electric conductivity compared to general drinking water.^[11] Some study results have presented that the magnetization of water increased the permeability through cell membranes^[12], and that the magnetic field directly affected intracellular fluid and intracellular substances to activate enzymes inside the cells and to accelerate biochemical reactions in the body.^[13] Thus it is possible that drinking magnetized water activates antioxidant enzymes in the body and reduces DNA damages, but the detailed mechanism of how the magnetized water can reduce DNA damages, oxidative stress and other actions are not yet known.

CONCLUSION

In this study, we found that the pH, iron concentrations like Calcium, Sulphate, Iron, Fluoride, nitrate, specific gravity and viscosity of magnetic water were changed. This means the change its vital Properties. This work can be extended to other properties to examine its change on magnetic water and which property is useful for Treatment of certain diseases and increase the body's immunity.

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