

**A STUDY ON ANTI INFLAMMATORY AND ANTI ARTHRITIC PROPERTY OF
PREPARED MAGNETIZED WATER**

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Summary

Modern medicine is evidence based. The evidence is derived from clinical research. Medical practices not part of modern medicine are collectively called as complementary and alternative medicine systems (CAMS). Various methods in complementary medicine have been practiced mainly based on experience rather than rational scientific exploration. Magneto therapy is one of such therapies, it is energy based practice. Alternating magnetic field/Pulsating magnetic field/ Magnets/Magnetized water is used in therapy. Magneto therapy broadly effective and regulates the natural system of body and rebalances altered functions. Above all, magneto therapy produces no harmful side effects, is not addictive, does not interfere with other therapies and is not expensive. The task of scientifically evaluating CAM medicines difficult but not impossible. The present study was driven by a desire to explore and uncover scientific predicaments of Magnetized water prepared at laboratory. 700 and 2000 Gauss strength magnets were used to prepare LPMW and HPMW respectively. The study has been done on magnetized water. In vivo studies showed anti-inflammatory and anti-arthritic property in experimentally (Formaldehyde) induced inflammation and Freund's adjuvant induced arthritis.

Key words: - Anti-arthritic, Anti-inflammatory, CAMS, HPMW (High powered magnetized water), LPMW (Low power magnetized water), MW (Magnetized water).

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Introduction

The entire cosmos is delicately balanced by magnetism. Earth is a big magnet. The ponderous flow of matter in earth's core acts, as dynamo is responsible for magnetic property of earth.¹ The magnetism of an atom or molecule of the substance is due to orbital and spin motion of electrons in it. Spin is everywhere, around every object in the universe. Spin forces produce rotation. Magnetic forces produce twist, push, and pull. Electric forces produce push or pull, gravity only pulls. In this way, the forces help to structure the universe. Man is tiny replica of universe. The life on earth is developed and evolved permanently under sun and influence of other fields. Magnetic field presence is universal and invisible. The electricity and magnetism are the twin manifestation of the same basic energy. All life exists in and responds to magnetic field of the earth.

Water is the most abundant body constituent Water is less dense liquid than as solid. The elements of water namely hydrogen and oxygen are unusually reactive. The water molecule is electrically neutral, but positive and negative charges not distributed uniformly, this constitutes electrical dipole². This dipole, as electrical image of water molecule. The water molecules joined by hydrogen bonding in a container hence, the whole mass of water in a container behaves as a single molecule. Intracellular water very close to any membrane or organelle is organized very differently from built water and that this structured water plays significant role in governing shape and biological activity of large folded biomolecules. The structure of water in this biomolecules is imposed solely by the geometry of the surrounding hydrogen bonding sites. The water molecules may form a 'thread' that can snake its way through more open space of the large molecules, that is water can have a highly organized local structures when it interacts with molecules capable of imposing these structure of water.

All living system contains minerals in their bodies. They need to function properly. These minerals activate biological energy to power circulation in the blood, which, along with minerals produce magnetic field. The magnetic field activates and stabilizes liquids in the body as well as already existing magnetic field. The biological properties originate from and are expressible in term of biomolecules. The essential aspect of living system is the coherence of its biomolecules.⁴ Cooperative and coordinating function of biomolecules is responsible for various activities in organism. The alteration in this entanglement of matter and energy state may lead to sick. Various energy fields like magnetic, electric, attractive, gravity and biophotons influence these activities. By manipulating either its matter or energy state or combination of two we can achieve healthy state. Magnetization transformed water into charismatic liquid.⁵ The trace elements present in water are responsible for retention of magnetic property in water. There is lengthening of hydrogen bond, lengthen the water lattice after magnetization. The p^H and redox potential of water alters when exposed to magnetic field. The reasons for this behavior are not clear but one possibility is that dissolved oxygen molecules, which are paramagnetic, may be involved.

The classical signs of an inflammatory process are redness, swelling, heat, pain and loss of function.^{6,7,8} It is likely that plasma proteins, vasoactive amines, tissue digestive enzymes, biologically derived oxidants and eicosanoids all participate in the process of inflammation. Rheumatoid arthritis is a chronic systemic inflammatory condition that is most patent in its synovial joint involvement. Inflammation may extend to extra articular sites such as tendons and organ structures.

Materials and Methods

Preparation of magnetized water⁹

It was prepared by premier magnet with magnetic field strength 700 and 2000 Gauss. The magnetic field strength measured by Gauss meter at Department of Physics, IISc Bangalore. Gauss meter Model G-11/G-14 Mfg by Control systems and Devices, Bombay.

Low power magnetized water (LPMW)

Procedure: - 2000ml previously boiled, cooled and filtered tap water was taken in beaker and premier magnets with magnetic field strength 700 Gauss was kept into the beaker and the beaker with magnet was kept on a wooden box covered with glass plate for 18 hours. After 18 hours water was ready for use.

High power magnetized water (HPMW)

Procedure: - It was prepared by using magnets with field strength 2000 Gauss. Two magnets with North Pole and South Pole markings were placed on a wooden box. 1000 ml previously boiled, cooled and filtered tap water containing beakers were kept on the magnets and beakers were covered with glass plates. The beakers were remained on magnets for 18 hours. After 18 hours North Pole and South Pole marking water were mixed in a clean bottle, the resulting water was ready for use.

Anti-inflammatory activity¹⁰

Animals: - Albino rats of Wister strain weighing between 150-200 Gms were obtained. The animals were housed in cage in a group of 08 numbers in plastic cages. The animal house conditions maintained were at temp $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$; relative humidity of $65 \pm 10\%$ and 12:12 hour's light:day cycle. Animals were fed with pelleted standard diet (Mfg by Agro Industries, Bangalore.) and water ad libitum for Group I and Group II. The Group III and Group IV animals were fed with pelleted standard diet and magnetized water ad libitum for 60 days prior to the experiment. In all undertaken experiments four groups of animals were taken and six animals were used in each group.

Group I	Control Normal saline 10ml/ kg per oral.
Group II	Phenylbutazone 100mg /kg per oral.
Group III	Lower power magnetized water ad libitum
Group IV	High power magnetized water ad libitum

Procedure: Animals were fasted for 18 hours, after administration of drug Phenylbutazone standard, 0.1ml of formaldehyde AR grade was injected subcutaneously, into sub plantar region of right hind paw. The left hind paw served as reference non inflamed paw for comparison

The paw volume of both hind paws was measured using plathysmograph, at 1.0, 2.0, 4.0, 6.0 and 24 hours after formaldehyde injection. The mean edema volume was calculated as shown in table no. 1. The parentage reduction in paw volume was determined as shown in table no. 2. The data subjected for statistical analysis for variance as shown in table no. 3.

Anti arthritic activity¹¹

Animals: - Albino rats of Wister strain weighing between 105-205 Gms were obtained. The animals were housed in cage in a group of 08 numbers in plastic cages. The animal house conditions maintained were at temp $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$; relative humidity of $65 \pm 10\%$ and 12:12 hour's light:day cycle. Animals were fed with pelleted standard diet (Mfg by Agro Industries, Bangalore.) and water ad libitum for Group I and Group II. The Group III and Group IV animals were fed with pelleted standard diet and magnetized water ad libitum for 60 days prior to the experiment.

In all undertaken experiments four groups of animals were taken and six animals were used in each group.

Group I	Control Normal saline 10ml/ kg per oral.
Group II	Phenylbutazone 100mg /kg per oral.
Group III	Lower power magnetized water ad libitum
Group IV	High power magnetized water ad libitum

Procedure: Animals were fasted for 18 hours, after administration of drug Phenylbutazone standard, 0.05ml of Freund's adjuvant was injected sub cutaneously, into sub plantar region of right hind paw. The left hind paw served as reference non-inflamed paw for comparison. The paw volume of both hind paws was measured using plathysmograph, at 4, 8, 12, 16, 20, 24, and 28th days after Freund's adjuvant injection. The mean edema volume was calculated as shown in table no. 4. The parentage reduction in paw volume was determined as shown in table no. 5. The data subjected for statistical analysis for variance as shown in table no. 6

Results

Anti-inflammatory activity

Edema Volume

It is observed that,

Group I treated with Normal saline showed mean edema volume 0.275 ml to 0.350ml.

Group II treated with Phenylbutazone showed mean edema volume 0.108 to 0.167ml.

Group III treated with LPMW showed mean edema volume 0.109 to 0.183 ml

Group IV treated with HPMW showed mean edema volume 0.075 to 0.247 ml.

Percentage edema Inhibition.

Group II treated with Phenylbutazone showed maximum percentage edema inhibition was 0.86 to 33.22 %.

Group III treated with LPMW showed maximum percentage edema inhibition was 0.86 to 36.13 %.

Group IV treated with HPMW showed maximum percentage edema inhibition was 0.02 to 33.85 %.

Anti Arthritic activity

Edema Volume

It is observed that

Group I treated with Normal saline showed mean edema volume 0.167 ml to 0.384ml

Group II treated with Phenylbutazone showed mean edema volume 0.108 to 0.316ml

Group III treated with LPMW showed mean edema volume 0.047 to 0.155 ml

Group IV treated with HPMW showed mean edema volume 0.157 to 0.333 ml.

Percentage edema Inhibition.

Group II treated with Phenylbutazone showed maximum percentage edema inhibition was 4.90 to 58.85 %

Group III treated with LPMW showed maximum percentage edema inhibition was 52.59 to 100.00 %

Group IV treated with HPMW showed maximum percentage edema inhibition was 1.83 to 39.65 %.

Table No: 1: Screening for Anti-inflammatory activity of Magnetized water using 1% Formaldehyde induced (acute model) Inflammation.**Mean Edema Volume**

Sr. No.	Treatment Group	Mean Edema Volume in 't' hours in ml			
		1.0	2.0	4.0	6.0
1	Normal saline + Formaldehyde	0.275± 0.04	0.317± 0.04	0.350± 0.04	0.333± 0.04
2.	Phenylbutazone + Formaldehyde	0.167±0.02	0.150±0.02	0.180±0.01	0.108±0.01
3.	Low power magnetized water + Formaldehyde	0.175±0.02	0.183±0.03	0.141±0.03	0.109±0.03
4	High power magnetized water + Formaldehyde	0.075±0.03	0.134±0.03	0.241±0.02	0.108±0.02

Table No: 2:Percentage Edema Inhibition

Sr. No	Time in Hours	Phenylbutazone	Low power Magnetized water	High power Magnetized water
1	1.0	33.22	36.13	0.02
2	2.0	15.61	26.02	10.57
3	4.0	4.14	05.28	33.85
4	6.0	0.86	0.86	0.86

Table No: 3: Anti Inflammatory Activity Of Magnetized Water (Formaldehyde 1.0% v/v solution)

ANOVA TABLE FOR TWO WAY CLASSIFICATION

Source	Some of Squares	Degree of Squares	Mean of sum of squares	Variance	Table value	Remarks
Between (rows) Treatment Groups	0.094	3	0.031	310	3.86	Significant
Between(Col) Within treatment Groups	1.0052	3	0.001	10	3.86	Significant
Error	0.011	9	0.001			

Table No: 4: Screening for Anti-arthritic activity of Magnetized water using Freund's adjuvant induced (chronic model) Inflammation.**Mean Edema Volume**

Sr. No	Treatment Group	Mean Edema Volume in days in ml						
		4	8	12	16	20	24	28
1	Normal saline + Freund's Adjuvant (FA)	0.307±0.05	0.327±0.07	0.384±0.04	0.221±0.07	0.234±0.05	0.167±0.07	0.217±0.12
2	Phenylbutazone + FA	0.316±0.02	0.213±0.10	0.158±0.06	0.160±0.06	0.143±0.04	0.108±0.02	0.113±0.03
3.	Low Power Magnetized water + FA	0.050±0.14	0.155±0.06	0.047±0.05	0.050±0.04	-----	-----	-----
4	High Power Magnetized water + FA	0.200±0.13	0.333±0.04	0.308±0.08	0.264±0.04	0.242±0.05	0.210±0.02	0.157±0.05

Table No: 5: Percentage Edema Inhibition

Duration in Days	Phenylbutazone	Low Power Magnetized water	High Power Magnetized water
4	4.9	83.00	33.55
8	34.86	52.59	01.83
12	58.85	87.76	19.79
16	27.60	77.37	19.49
20	38.88	100	25.74
24	35.32	100	25.74
28	51.29	100	39.65

Table No:6: Anti Arthritic Activity Of Magnetized Water

(Freund's adjuvant)

ANOVA TABLE FOR TWO WAY CLASSIFICATION

Source	Some of Squares	Degree of Squares	Mean of sum of squares	Variance	Table value	Remarks
Between (rows) Treatment Groups	0.2096	3	0.069	34.5	3.16 5.09	Significant
Between(Col)) Within treatment Groups	0.0692	6	0.011	5.5	2.66 4.01	Significant
Error	0.04	18	0.002			

Discussion

Each cell is an electromagnetic machine. Each cell has positive and negative field. Physical and mental functions are controlled by electromagnetic impulses from brain and central nervous system. Moreover body is equally sensitive to electromagnetic field. Formaldehyde edema is simple and Freund's adjuvant edema is chronic in nature. The degree of magnetization depends on quantity of water used, the power of magnet and duration of contact. The anti-inflammatory activity of magnetized water was evaluated in magnetized water fed animals with formaldehyde induced acute model and Freund's adjuvant induced chronic model.

The maximum percentage edema inhibition in **acute** model shown by phenylbutazone 100 mg /Kg/oral was 0.86-33.22. Low power magnetized water treated group showed 0.86-33.85 and High power magnetized water treated group showed 0.02-33.85.

The maximum percentage edema inhibition in chronic model shown by phenylbutazone 100mg/Kg/oral was 4.90-58.85. Low power magnetized water treated group showed 52.59-100. The High power magnetized water treated group showed 1.83-39.65. The results were exclusively good and promising.

The study showed that LPMW shown better response than HPMW in both acute and chronic models. The low power magnetized water is more efficacious than phenylbutazone and High power magnetized water. The possible mechanism of action may be due to any of the following reasons either single or in combination.

Increasing blood flow at the site of injury, increase in oxygen carrying capacity of blood, changes in ion movement, that is migration of calcium ions away from the injury site, alteration in p^H after magnetization, influence on endocrine gland secretions, alteration in enzyme activation and other biochemical processes, rebalancing altered metabolism, improving functioning of autonomic nervous system, increased synthesis of ATP etc.

Magnets are used in spacecraft to protect the astronauts from bone loss, disorientation and other magnetic deficiency syndrome. It is necessary to evaluate anti-inflammatory and anti arthritic activity on humans in clinical conditions which may prove innovative. That would be one of the most exciting scientific breakthroughs in application of magnetized water in treatment of inflammation.

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