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Effect of Magnetic Water on Some Physiological Aspects of Adult Male Rabbits

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Summary

The present study was undertaken to search out thebeneficial effect of magnetized water on serumantioxidant, lipid profile and total protein of adult male rabbits. Twenty adult male rabbits were randomly divided into two equal groups and were treated daily for 60 days as follows:Group C:Rabbits of this group were allowed to ad libitumsupplyofdrinking water (control group),Group MG:Rabbits of this group were allowed to ad libitum supply of magnetic water.Fasting blood (for 8-12 hrs) samples were drawn by cardiac puncture technique at different times 0, 30 and 60 days of experiment for measuring the following parameters. Serum glutathione concentration (GSH), lipid profile including serum triacylglycerol (TAG), total cholesterol - (TC), high density lipoprotein - cholesterol (HDL-C), low density lipoprotein - cholesterol (LDL-C) and very low density lipoprotein cholesterol - (VLDL-C), total serum protein concentrations (TSP). The result revealed that drinking of magnetic water had beneficial effect on some physiological aspects manifested by a significant elevation in serum GSH, HDL-C and total serum proteins concentration. In addition to significant suppression in serums TC, TAG, LDL-C, and VLDL-C concentrations .In conclusion the results of this study pointed to the prevalence of magnetic water upon normal drinking water in all measures issued.

Key Words: lipid profile ,GSH, magnetic water.

دراسة التاثير الأيجابي للماء الممغنط على بعض المعايير الفسلجيه في ذكور الأرانب البالغة

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الخلاصـــــة

صممت هذه الدراسة لمعرفة الدور الأيجابي للماء الممغنط على موانع الأكسدة ،الصوره الدمويه للدهون والبروتين الكلي في الأرانب السليمة. تم أستخدام (20) من ذكورالارانب البالغة قُسّمت عشوائيا الى مجموعتين متساويتين وعوملت كألتالي لمدة60 يوم: اعطيت المجموعة الاولى ماء الشرب العادي وعدت كمجموعة سيطره (Group C) ،في حين أعطيت حيوانات المجموعة الثانية الماء الممغنط (Group MG).تم جمع عينات الدم في الفترات 0 و 30 و 60 يوم من التجربة ,وتم سحب الدم بطريقة الوخز القلبي لغرض دراسة المعايير التالية : قياس تركيزكل من الكلوتاثايون (GSH) , الكوليستيرول الكلي (TC) وكلسيرول ثلاثي الأسيلTAG)(و الكوليستيرول في الشحوم البروتنية ذات الكثافة العالية(HDL-C)والكثافة الواطئة(LDL-C) والواطئةجدا(VLDL-C), بالاضافة الى تركيز بروتين مصل الدم الكلي (TSP . اظهرت نتائج هذه الدراسة ان تعرض الحيوانات للماء الممغنط له تاثير ايجابي على بعض المعايير الفلسلجيه والتي تمثلت بحصول زياده معنويه في تراكيز GSH و HDL-C و TSP. بالاضافة الى حصول انخفاض معنوي في تراكيز كل من TC، TAG، LDL-C و VLDL-C في مصل الدم. لقد اكدت نتائج هذه الدراسة التاثير الأيجابي للماء الممغنط وتغلبه على ماء الشربفي كل المعايير المدروسة.

Introduction

Water is Paramagnetic meaning that it holds a magnetic charge. Para-magnetism occurs primarily in substances in which some or all of the individual atoms, ions, or molecules possess a permanent magnetic dipole moment. Water has a dipole moment and is, therefore, subject to paramagnetism (1).In nature, the earth's magnetic field naturally charges water in lakes, wells, and running streams. However, as water passes through treatment plants and is transported through pipes to our home or work place, it loses its magnetic charge. Treating water with magnetic fields simple restores the natural energy and balance that nature

intended(2). Magnetized water tastes sweeter and has more clarity; promote a more alkaline PH in the body; Magnetic water controls scale buildup in pipes and plumbing. It has a positive effect on plant growth. Magnetizing water reduces the surface tension of water making it feel softer (3). It is thinner, wetter, and more absorbable, so it is better able to penetrate cell walls and deliver the nutrients that it carries. Magnetized water is claimed to be energy building, activating, cleansing, and detoxifying. There was a report of people resolving bladder problems, recovering quickly from a stroke, alleviating arthritis pain and reducing blood pressure by drinking magnetized water (4).On the other hand, researchers recently reported that magnetized irrigator can reduce calculus formation and improve health over all gum (5). Many researchers found that the use of magnetized water increased farm yields by anywhere from 5 to 30 per cent. Cows drinking magnetized water produced more milk and were healthier than cows drinking untreated water. Sheep produced more wool and meat, hens laid more eggs and all farm animals survived longer when drinking magnetized water (6).

The increasing production of electric (EF) and magnetic fields (MFs) due to the expanding use of electronic devices in normal life is encouraging studies on the effects of these fields on living organisms with a view to better protecting human health against their probable unfavorable effects (7). However, over the past few years, a considerable alteration was given to the potential bio effect of magnetic field.This study was designed to investigate the beneficial effect of magnetized water on different organs in the body.

Materials and Methods

Magnetized water was prepared using magnetic funnel. Water was passed through magnetic funnel (Magnetic Technologies LLC, Registered Pattern No. 1826921) at relatively low speed to prevent overflow and collected into graduated cylinders for distribution. Rabbits were provided with fresh magnetic water treatment (MWT) every 12 hours following the recommendations of the magnetic funnel manufacturer. strength of the magnets was between 450-500 gauss.

Twenty adult male rabbits were randomly divided into two equal groups and were treated daily for 60 days as follows: Group C: Rabbits of this group were allowed to ad libitumsupplyofdrinking water (control group), Group MG: Rabbits of this group were allowed to ad libitum supply of magnetic water. Fasting blood (for 8-12 hrs) samples were collected at different times 0, 30 and 60 days of the experiment .Blood was drawn by cardiac puncture technique. Blood samples were kept in tubes, and centrifuged at 2500rpm for 15 minutes, and then serum samples were liquated and frozen at -20˚C until analysis for measuring the following parameters: Serum glutathione concentration (GSH) according to (8), lipid profile including serum triacylglycerol (TAG), total cholesterol - (TC) and high density Lipoprotein - cholesterol (HDL-C)concentrations using enzymatic kits (Linear chemicals Barcelona ,Spain) , low density lipoprotein - cholesterol (LDL-C) and very low density lipoprotein cholesterol - (VLDL-C concentrations (9), total serum protein concentration using enzymatic kits (Linear chemicals Barcelona ,Spain) . The following physical properties of magnetic water were measured at EbinSena laboratories – industrial ministry:PH, Electrical conductivity, Oxygen content in dissolved water, Surface tension, Chloride concentration ,Viscosity, Evaporating temperature.

Statistical analysis of data was performed on the basis of Two-Way Analysis of Variance (ANOVA) using a significant level of ($P<0.05$). Specific group differences were determined using least significant differences (LSD) as described by (10).

Results

The effect of magnetism on physical properties of water is clarified in table-1**.**

Table (1) Physiological properties of normal and magnetic water.

Physical properties	Drinking water	Magnetic water
Electrical conductivity(µs/cm)	498	503
Oxygen content (mg/L)	51.5	72.5
PH	7.53	7.68
Surface tension(Dyn/cm)	66.56	58.89
Chloride concentration(ppm)	61.24	52.12
Viscosity(cst)	0.794	0.792
Evaporating temperature(gm/hour)	0.75	0.72

Serum reduced glutathione (GSH) concentration (µmol/l)

The protective effect of magnetized water on the antioxidant status of the animal was clarified after one month of treatment , where as a significant elevation (P<0.05) in serum GSH concentration (µmol/l) was detected in T group (29.60±0.92) as compared to control groups . Results have also clarified that exposure to magnetic water for 60 days caused further significant (P<0.05) elevation in serum GSH concentration

Table (2): Effect of exposure to magnetized water for 60 days on serum glutathione concentration (µmol/l) of adult male rabbits

Day / **Groups**	Zero	30	60
Control (drinking water)	21.4±0.5 A a	21.6±0.5 Aa	22.8±0.73 Aa
MG (Magnetic water)	21.6±0.5 A a	29.6±0.92 Bb	36.6±0.92 B c

Values are expressed as mean ± SE, n = 5 each group .Capital letters denote differences between groups, P<0.05 vs. control. Small letters denote differences within group.

Lipid profile tests:

Non-significant differences (P>0.05) in the mean values of TC(table-3) and LDL-c (table-4) concentrationswas observed in control and magnetized group along the experimental period. While the values of serum TAG (table-5) and VLDL-c concentrations (table-6)tended to decrease significantly (P<0.05) following exposure to magnetic water for 60 days of the experiment comparing to control group. On the other hand, magnetized water caused a significant elevation (P<0.05) in serum HDL-C concentration (table-7) after 60 days of the experiment comparing to control and the values seemed to exceed that of the control at the end of the experiment with mean values of (33.16±0.2) and (25.08±1.37) for T and the control groups respectively.

Table (3): Effect of exposure to magnetized water for 60 days on total serum cholesterol (TC) concentration (mg\dl) of adult male rabbits.

Day / **Groups**	Zero	30	60
Control (drinking water)	116.4±2.92 A a	117.8±1.15 Aa	118.4±0.67 Aa
MG (Magnetic water)	119.2±2.15 A a	116.6±1.36 Aa	118.8±1.06 Aa

Values are expressed as mean ± SE, n = 5 each group. Capital letters denote non significantdifferences between groups, P<0.05 vs. control.Small letters denotenon significantdifferences within group.

Table (4): Effect of exposure to magnetized water for 60 days on serum low density lipoprotein - cholesterol (LDL-C) concentration (mg\dl) of adult male rabbits.

Day / Groups	Zero	30	60
Control (drinking water)	69.64±3.63 A a	70.22±1.65 A a	72.84±1.49 A a
MG (Magnetic water)	70.22±1.13 A a	66.66±2.54 A a	68.28±1.25 A a

Values are expressed as mean ± SE, n = 5 each group. Capital letters denote non significant differences between groups, P<0.05 vs. control. Small letters denote non significantdifferences within group.

Table (5): Effect of exposure to magnetized water for 60 days on serum triacylglycerol (TAG) concentration (mg\dl) of adult male rabbits.

Day / Groups	Zero	30	60
Control (drinking water)	102.8±3.78 A a	98.2±1.59 Aa	102.4±4.08 Aa
MG Magnetic water	104.6±2.2 A a	100.0±5.44 Aa	86.8±1.9 Bb

Values are expressed as mean ± SE, n = 5 each group. Capital letters denote differences between groups, P<0.05 vs. control.Small letters denote differences within group.

Table (6): Effect of exposure to magnetized water for 60 days on serum very low density lipoprotein - cholesterol (VLDL-C) concentration (mg\dl) of adult male rabbits.

Day / Groups	Zero	30	60
Control (drinking water)	20.56±0.75 A a	19.64±0.31 A a	20.48±0.81 Aa
MG Magnetic water	20.92±0.44 A a	20.0±1.08 A a	17.36±0.38 B b

Values are expressed as mean ± SE, n = 5 each group. Capital letters denote differences between groups, P<0.05 vs. control.Small letters denote differences within group.

Table (7): Effect of exposure to magnetized water for 60 days on serum high density lipoprotein - cholesterol (HDL-C) concentration (mg\dl) of adult male rabbits.

Day / Groups	Zero	30	60
Control (drinking water)	27.2±1.56 A a	27.94±1.51 A a	25.08±1.37 A a
MG Magnetic water	28.06±0.93 A a	29.94±0.36 A a	33.16±0.2 B b

Values are expressed as mean ± SE, n = 5 each group. Capital letters denote differences between groups, P<0.05 vs. control. Small letters denote differences within group.

Total Serum Protein

Blood samples were obtained from rabbits after 30 and 6o days of treatment revealed significant increase (P<0.05) in total serum protein concentration in magnetized water comparing to control (table -8).

Table (8): Effect of exposure to magnetized water for 60 days on total serum protein (TSP) concentration(g\l)of adult male rabbits.

Day / Groups	Zero	30	60
Control (drinking water)	5.20±0.10 A a	5.30±0.12 Aa	5.50±0.10 Aa
MG Magnetic water	5.30±0.10 A a	5.76±0.07 Bb	6.82±0.11 B c

Values are expressed as mean ± SE, n = 5 each group. Capital letters denote differences between groups, P<0.05 vs. control. Small letters denote differences within group.

Discussion

There is a long history of the promotion of magnets to improve the quality and health benefits of water. Researchers found when a permanent magnet is kept in contact with water for a considerable period of time; water gets magnetically charged and acquires magnetic properties. Such magnetically treated water has its effect even on the human body when taken internally and regularly for a considerable period of time (11). Physics shows that water changes weight under the influence of magnetic fields. More hydroxyl (OH-) ions are created to form alkaline molecules, and reduce acidity. Increasing both the electric conductivity and the dielectric constant of water was documented (12). Some researchers reported that magnetic treatment affect water properties such as light absorbance , PH , surface tension(13) and amount of oxygen dissolved in water (14). Change in the surface tension of water within the time can be a key point in tracing impurities in water (3). Normal water has a pH level of about 7, whereas magnetized water can reach pH of 9.2 following the exposure to 7000 gauss strength magnet for a long period of time (11). It may be concluded that, the applied magnetic field may affect the formation of hydrogen bonds of water molecule and that may lead to conformation changes. These changes may be the reason for the observed variations in both conductivity and dielectric content (12).

Concerning GSH concentration, significant elevation was observed in these parameters in MG group. Vendors of magnetic water treatment devices have claimed that powerful magnetic fields can affect the structure of water molecules or the properties of solutes passing through the magnetic field, thus eliminating the need for chemical softening agents (15). The results described in this study are not completely conclusive, since in several cases they are contradictory. Some authors showed that exposure to a low magnetic field had no effect on the antioxidant capacity and lipid peroxide level of normal animal but it decreased plasma peroxide level in stressed rats (16).

It is also possible that EMF can ameliorate the deleterious effects of these molecules (Free radicals) by decreasing the chemical reactions that caused damage to DNA, proteins and lipids. Alternatively, applied magnetic fields to water through using magnetic funnel may increase the desired fates of these molecules; specifically, by increasing their rates of degradation by reaction with protective enzymes such as catalase and superoxide dismutase (17,18). It can be concluded that intensity and duration of exposure to magnetic field including exposure of water to 500 gauss by magnetic funnel are effective in the formation of FRs and behavior of its antioxidant activity (19).

The effect of magnetic water on serum TAG and VLDL-c concentration (decrease) with elevation in serum HDL-c concentration indicated its hypotriglyceridimic effect and its beneficial in elevation of good cholesterol. A therapeutic effect of EMF on obesity and complicated hyperlipidemia was documented by (20).single exposure to electromagnetic field (EMF) increase the serum values of HDL-c and decreased total cholesterol concentration of rat liver (21). On the other hand, a beneficial effect of EMF was also reported in diet induced hypercholesterolemic rabbit, where pulse of EMF lowered total cholesterol and triglyceride level (22). Similar results were found in rats (23,16)and mice (24) as well as in human. The

most pronounced change was found in steelworker deal with large exposure to EMF (25).The mechanisms of the effect of EMF (which affect water quality) after exposure to magnetic funnel on lipid metabolism have not been well understand yet. However, the antioxidant activity of magnetic water was claimed to be responsible for its hypolipidemic effect.

The main functions of protein in blood coagulation, in host defense against pathogens and regulation of cellular metabolism (26), its elevation by magnetic water treatment indicated maintenance of cellular functions (27).Present data showed that EMF exposure increased plasmatic total protein levels suggesting the change in protein metabolism of stressed rat. However, a slight decrease of total serum protein levels was clarified in steelworkers after exposure to an electromagnetic field(28). This discrepancy could be attributed to the difference of the intensity of the EMF and the exposure scenario and duration. The mechanism of EMF action in biological systems can be examined by its interaction with moving charges and enzymes activities rates in cell-free systems increasing transcript levels for specific genes. However, EMF also interacts directly with electrons in DNA to affect protein biosynthesis (29).

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