American Journal of Biology and Natural Sciences
https://biojournals.us/index.php/AJBNS
ISSN: 2997-7185

Study of Health Parameters Changes for Local Male Rabbits when Supplied Water with Potassium Permanganate (Kmno4) and Chlorine

Mohammed Abdulhamza Jummah, Ghaith Sabah Tuaimah
University of Wasit / College of Veterinary Medicine, Iraq

Shahad Kadhim Jaafar
University of Wasit / College of Education for Pure Sciences, Iraq

Received: 2024, 15, May
Accepted: 2025, 21, Jun
Published: 2025, 05, Jul

Annotation: Thirty-two local male rabbits were four groups were created at random.: GM1 first group (water free of chlorine) control group, GM2 second group (provided tap water), GM3 third group (Potassium permanganate (1) P.P.M.), and GM4 fourth group (Potassium permanganate (2)P.P.M.) to investigate the disinfection effectiveness of Potassium permanganate or chlorine in tap water on a few physiological and liver enzymatic parameters. Serums were obtained after blood samples taken. The values (Hb: 18.61 gm/dl, PCV percent: 43.58, total protein: 8.03 gm./dl, albumen: 5.19 gm./dl , and globulen : 3.76 gm./dl) in the tap water group were substantially (P0.05) greater than in the other groups. When compared to the other groupings, the tap water group had considerably lower levels of ALT (40.09IU/L), AST (26.76 IU/L), and ALP (31.52 IU/L).

Keywords: PCV, Potassium permanganate, male rabbits, Haemoglobin, Globulen.

Introduction

Every biological function that occurs inside the animal body involves water, either direct or indirect. Water facilitates the flow of food through the gastro-intestinal tract by carrying nutrients, organic waste, hormones, and other chemical messengers. Water is a major constituent of secretions like saliva and milk, and it helps maintain blood osmotic pressure.. (1,2). Water is an essential component of the environment, and the physical, chemical, and biological characteristics of water determine its quality [3]. However, because water is used in far greater quantities than other nutrients, its availability and quality are critical for animal health, prosperity, and productivity. [1, 4] Reducing livestock's access to water will drastically reduce productivity, and Bad water to drink is frequently a factor restricting intake; given that a huge amount of water is consumed, if the water is of poor quality, there is a greater danger that pollutants will spread to levels that are potentially toxic. [3, 5].

Sensory (organoleptic), physiochemical, chemical, and excess minerals compuond are the key features to consider when analyzing water integrity for livestock [6, 7], hence water for livestock must be evaluated on a regular basis, with regards to the drinking water integrity guide for animals. [8].

Decisions to enhance the poor quality of livestock source water, potable water by using water handling device, drinkable water is purified to deactivate microbes found in water, and the popular form of decontamination is chlorinization, but others around the world also use ozone and ultra violet (UV) light, as well as potassium permanganate (KMnO4). [9, 10]. Because of its cost and efficiency, Chlorine is frequently used as a sanitizer and preoxidizer of water to drink. However, chlorine encounters natural organic matter in water, creating possibly toxic chemicals called (DBPs) or disinfection by-products [11-13], and the probable impacts of (DBPs) on generative consequences is examined in greater detail by numerous animal studies conducted in labs. [14-16].

As a result, as previously stated, and because of the use of chlorine for water disinfection Adding chlorine to untreated water has the same effect. in the formation of (DBPs) that have carcinogenic effects, prechlorinization is being steadily controlled in most Western nations, [17]. In addition, Potassium permanganate is an oxidative component broadly used across the water manufacturing, It's additionally been employed as a hand sanitizer for raw water and mainly used for terminating organic matter [18]. [19]. Potassium permanganate has various applications, including regulating the synthesis of (DBPs) by precursors that oxidize and minimize the query for alternative sanitizers rather than chlorine. Attacks a wide spectrum of water-borne pathogenic organisms as an oxidant and inactivator; inactivation efficacy is also dependent on concentration of permanganate, time of contact, temperatures, pH, also the existence of other oxidization constituents [20]. As a result, the purpose of this study was to compare the efficacy of treated water with Potassium hydroxide vs water treated with chlorine on various hygiene parameters in local male rabbits.

Method

- Trial plan and animal used:

The trial were completed in the animal farm of Veterinery Medicine collegge \ Bagdad University through (January - March 2022), to determine the strength of disinfection for (KMnO4) and\or chlorine in water that has been treated on some physiological measurements of male rabbits in area. About (32) rabbits with age of (2-4) months. After being examined to make sure they were healthy and receiving treatment to avoid parasites, experimental groups were given a period of fourteen days to adjust. For every group, body weight was considered. The animals were given free access to green grass and fed 100 gm/head of food pellets., also divided as (4) group (eight each one) as following: The initial group (GM1), gives water where free of chlorine (refreshing

boiling water) kept as negative control group, second (GM2)

This experiment was accomplished in the animal field of veterinary medicine college/Baghdad University during (February ~ April 2021), to find out the disinfection strength of (KMnO4) or chlorine in treated water on some physiological parameters of local male rabbits, Thirty-two local male rabbits at age of (2~4) months. Experimental groups were checked to confirm their health and preventive treated against the parasite, experimental animals left about (14) days for adaptation. The body weight was considered for all groups. The animals fed on diet pellets (100 gm/head) and offered green grass freely, also organized as four groups (8 each) as fallowing: the first (GM1) drinking water free of choline (refreshing boiling water) kept as negative control group, second group (GM2) drinking (tap water treated chlorine) kept as positive control group, third (GM3) and fourth (GM4) drinking water treated with (KMnO4) with concentricity (1 P.P.M./l., 2 P.P.M./l.) separately. The specimen of blood were taken once every two weeks, serum gained for biochemical analysis and blood parameters.

- The biochemical analysis

Haemoglobin (Hb), Paked cells volumes (PCV%) (21,23), whole proteins and its function, functions of liver enzyme action: Alanines amoinotransferase (ALT), Aspertate amino-transferase (AST) and Alkeline Phosphatase (ALP) was measurement of concentrations done by research existing kit (SYRBIO Diagnostic) in spectro-photometer and reflotron (21-27).

- Examination of chemicals

The liquid which contain (KMnO4) produced with conc, about (1P.P.M.,2P.P.M.) (28-29). Waters fineness (tap waters) checks out to estimate the concentration of non-conjugated chlorine (P.P.M.) by collecting (60) sample and employing cutting-edge numerical equipment (pocked colori-meter 2 checks for free-chlorine) and adhering to the manufacturer's instructions for a particular testing technique; this instrument is also highly sensitive and sophisticated.(0.01–1.0 P.P.M.) (30).

- Statistician investigation

Haematological and sereological information was considered as a full randomised plan (4 treatment) (C.R.D.). Laest significants difference (L.S.D) were useful to identify the significants difference by different group mean at ($p<0.05$) levels (31).

The result and discussion

1. Blood haemoglobin (H.b.) gm./dl.

full randomized design significants ($p<0.05$) difference between the sets at various times were revealed by the results. While the 1st. and 3rd. group (KMnO4 “1 P.P.M.”) participate in the 2nd group recorded of more significants difference at certain periods of the research, the 4th. group displayed a steady falling with progressive time, while the 2nd. groups appeared significantsly ($p<0.05$) upper value of blood hemoglobin compared to others group (table no. 1).

Table one: Results of haemoglobin H.b (gm/d.l) for trail animals (means ± SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	13.72±0.98 Aa	15.21±0.85 Aa	16.02±0.89 A Ba	13.79±0.80 B Cb	14.63±0.84 B b
GM 2	16.01±0.32 A	15.21± 0.52 A	17.44±0.21 A	17.40±0.14 A	18.61±0.12 A
GM 3	13.22±0.32 B	16.12±0.08 A	15.91±0.29 B	14.85±0.80 B	12.02±0.99 C
GM 4	13.02±0.82 B	14.10±1.02 C	13.19±1.01 C	12.06±0.92 C	11.72±0.99 C

The different capital letters refer to significants different resultes at (P<0.05).

2. Packed Cells Volume (PCV%)

The PCV readingms displayed the same pattern as the Hb (table 2). Compared to the other groups, the second group's values was significantsly higher (p<0.05).

Table two: Results of P.C.V. % for male rabbits (means ± SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	37.30±0.21 A	35.93±1.22 A	38.11±1.01 AB	37.35±0.99 B	33.15±1.27 B
GM 2	36.70±1.98 A	36.99±1.89 A	40.09±0.91 A	39.99±1.76 A	43.58±0.89 A
GM 3	35.79±2.59 A	34.55±1.87 A	36.41±0.88 B	37.32±0.65 B	33.59±0.76 B
GM 4	37.39±2.04 A	36.51±1.91 B	35.42±1.93 B	34.87±0.91 B	33.23±0.62 B

The different capital letters refer to significants different results at (P<0.05).

The gradually increased in the blood components Hb and PCV tables (1, 2) in the treated groups particularly second group could be attributed to the concentration of chlorine and KMnO4. These compounds could provide a healthy environment in the digestive tract of animals, and this will lead to increasing the absorption of nutrients in the intestine. In other words, it's resulted more metabolic activation in animals and stimulate erythrocytes synthesis due to synthesis the erythropoietin in haemopoitic tissue of bone marrow. The present results agreed with results obtained by some researches [31-34]. However, the reduction in certain elements especialy in the 4th set could be attribute to the oxidation position of KMnO4 and Anemia is caused by its excessive content [35, 36].

3. Concentration of whole proteins (gm./d.l)

According to table (three), the 2nd group values are significantsly (p<0.05) greater of the additional group. The results clearly show that the protein concentrate trend appears to be increasing steadily. However, as the trajectory of every other group appears to be erratic, no particular trend was found in the other groups.

Table three: Result of serum total proteins (gm. / dl) for trail animals (means ± SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	6.82±0.48 A	6.49±0.69 B	6.99±0.85 AB	7.51±0.33 A	6.29±0.47 B
GM 2	6.31±0.20 A B	7.10±0.19 A	7.64±0.22 A	7.06±0.19 A	8.03±0.60 A
GM 3	6.31±0.39 A	6.41±0.88 B	6.18±0.71 B	6.24±0.17 B	5.70±0.31 C
GM 4	5.88±0.43 B	6.24±0.91 B	6.41±0.30 B	6.44±0.45 B	5.68±0.52 C

The different capital letters refer to significants different results at (P<0.05).

4. The concentration of Serum Albumens and Globulen (gm. /dl)

The table (4 and 5) show like inclinations for albumens and globulen content. And noted the 2nd groups noted significantsly (p<0.05) greater value compared to other group. Except for the last period, the 1st and 2nd groups were identical.

Table 4: impact of treated water on local male rabbits' blood albumen levels (gm/dl) (means ±SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	4.05±0.51 A	4.87±0.40 A	4.29±0.17 A B	4.66±0.10 A B	4.61±0.22 B
GM 2	4.31±0.87 A	4.72±0.84 A	4.89±0.58 A	5.11±0.49 A	5.19±0.45 A
GM 3	4.40±0.15 A	3.62±0.19 B	4.57±0.55 A B	4.20±0.53 B	4.42±0.50 B
GM 4	4.25±0.21 A	4.31±0.23 A B	4.05±0.29 B	3.67±0.30 C	3.71±0.39 C

The different capital letters refer to significants different results at (P<0.05).

Table 5: Impact of treated water on local male rabbits' blood globulen levels (gm/dl) (means ±SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	3.1±0.52 A	2.90±0.49 B	3.47±0.45 A	3.72±0.64 A B	3.20±0.59 B
GM 2	3.12±0.44 B C	3.33±0.32 B	3.74±0.32 A	3.68±0.52 A	3.76±0.55 A
GM 3	3.23±0.11 A B	4.04±0.30 A	3.15±0.62 B	3.17±0.78 B	2.26±0.80 C
GM 4	2.19±0.08 C	3.13±0.05 B	3.09±0.32 B	3.06±0.31 B	3.01±0.79 B

The different capital letters refer to significants different results at (P<0.05).

The gradually increased in values of total protein and its fractions in the treated group whether at acclimation up to end of experiment especially second group (tables 3, 4, 5) or in some periods could be referred to the role of the chlorine and KMnO4 concentration as disinfectants [37, 38]. The role of these compounds could promote the body health systems and organs like liver which is considered one of the important organs in the body [39, 40]. Moreover, it could be attributed to

their role in synthesis protein components. Similar results were obtained by some studies [34, 41]. The increasing in the globulen could be due to the positive effect of the chlorine and KMnO4 on humeral immunity to produce globulens [42]. The lower means of globulen were recorded in the fourth group. These results could be due to the toxic properties of KMnO4 particularly the Mn, as it may have numerous negative consequences on various organs, including the liver. The high concentration of manganese in the blood could be accumulated in the liver and affect its activity in the production of proteins and enzymes. These results agreed with [36, 43].

5. Liver Functions and enzymes activities (ALT, AST, ALP)

From acclimation to the completion of the experiment, the 3rd and 4th group had significantsly (p<0.05) greater liver enzyme (ALT) values than the other groups, tables (three-six). Parallel inclinations was obtaining for A.S.T. and A.L.P. Compared to the first and second arrange, the 3rd and 4th sets verified significantsly (p<0.05) high assessments, (tables seven and eight).

Table six: results of alanines amino-transferase enzyme (A.L.T.) (IU /L.) for trails animals (means±SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	52.63±2.04 D	55.35±0.71 B	60.29±0.87 C	64.19±0.27 C	63.05±0.99 C
GM 2	57.04±2.42 C	54.38±2.41 B	55.52±2.32 D	44.23±2.50 D	40.09±3.04 D
GM 3	68.45±3.61 A	71.21±4.09 A	80.44±2.51 B	88.64±2.74 B	99.98±0.84 A
GM 4	61.20±3.42 B	79.33±2.51 A	84.37±2.08 A	89.97±3.21 A	92.51±3.62 B

The different capital letters refer to significants diverse consequences at (P<0.05).

Table seven: results of aspartate aminotransferase (A.S.T.) enzyme (IU/L/) for trails animals (means ±SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	35.27±0.86 B	37.05±0.22 B	33.08±0.41 C	30.01±1.02 C	31.20±0.79 C
GM 2	37.64±0.62 A	34.07±0.45 C	32.54±2.03 C	29.33±0.08 C	26.76±0.61 D
GM 3	38.66±2.04 A	42.35±2.21 A	46.75±0.87 B	60.15±0.42 B	68.24±0.52 B
GM 4	36.42±0.90 A B	44.21±0.52 A	50.02±0.69 A	70.22±1.05 A	88.49±2.25 A

The different capital letters refer to significants differed result at (P<0.05).

Table eight: results of alkaline phosphate (A.L.P.) enzymes (IU/L.) for trails animals (means ±SE)

periods gmroups	Adaptation period	First period	Second period	Third period	Fourth period
GM 1	52.41±1.64 A	49.33±0.54 A B	43.65±2.13 C	40.21±0.94 C	38.52±2.37 C
GM 2	51.32±0.74 A	44.25±0.51 C	40.61±2.40 C	38.74±0.96 C	31.52±2.03 D
GM 3	50.12±0.62 A	55.42±2.31 A	60.11±0.52 B	64.35±0.74 B	67.25±0.32 B
GM 4	39.45±0.95 B	50.21±0.43 B	68.47±2.33 A	71.52±2.42 A	80.01±2.11 A

The different capital letters refer to significants differently result at (P<0.05).

Steadily rising ideals of ALT, AST, ALP in groups that received KMnO4 about (1 P.P.M., 2P.P.M.) could indicate a hepatic oxidative stress by minimizingm the level of hepato-protective like glutathiones as an antioxident while metabolized manganese. These findings supported earlier results from certain studies. [44- 46].

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