



ToxicoPathological study of the wells' water effect on tissues and meat of animals and its' sequel on public health

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Abstract.

This study was designed in order to detection of the 'toxic effects of wells' water meat; tissues of animals, and identify its sequel on public health, we used samples of wells' water; tissue of animals which were consumed water from wells' water; animals' meat of sheep and cattle saleable in different places in Baghdad city, which supply with wells' water. Samples submitted to biochemical and microbial and pathological examination. Results showed evidence of pollution in wells' water with different toxic agents. As well as presence of lesions grossly and microscopically in investigated internal organs characterized mainly by loss of normal appearance of tissues in general view grossly and vacuolar degenerative changes mainly in liver, Kidney, GIT, with neuronal vacuolation from demyelination and edema in brain with degeneration and inflammation in muscles microscopically. A conclusion water of wells caused toxic effects on tissue of animal, and so affects human beings due to consumed meat production of these animals.

Key words: wells' water, animals' meat, toxic effects, Public health.

Introduction:

Wells' water its' ground earth water which concluded on water from rain, rivers, seas, snows and wasted water that's drainage inside earth bottom during winter were there's no sunshine to make dryness. This water used to consumption of animals and human. Wells are varying greatly in depth, water volume, and water quality⁽¹⁾. Well water typically contains more minerals than surface water⁽²⁾. Most of the bacteria, viruses, parasites, and fungi that contaminate well water come from fecal material from humans and animals. Common bacterial contaminants include *E. coli*, *Salmonella*, *Shigella*, and *Campylobacter jejuni*. Common viral contaminants include *norovirus*, *sapovirus*, *rotavirus*, enteroviruses, and hepatitis A and E. Parasites include lamblia, *Cryptosporidium*, *Cyclospora cayetanensis*, and microsporidia.^(2; 3) Chemical contaminants groundwater such as Nitrates from sewage or fertilizer are a particular problem for children. Pollutant chemicals include pesticides and volatile organic compounds from gasoline, dry-cleaning, the fuel additive methyl tert-butyl ether (MTBE), and naturally occurring fluoride, which is desirable in low quantities to prevent tooth decay, but can cause dental fluorosis in higher concentrations.^(2; 3) Calcium and magnesium cause what is known as hard water which can precipitate and clog pipes or burn out water heaters; iron and manganese can appear as dark flecks that stain clothing and plumbing and can promote



the growth of bacteria that can form slimy black colonies that clog pipes⁽³⁾. Several minerals are also contaminants as lead leached from brass fittings or old lead pipes; Hexavalent chromium (chromium VI)^(4;5). Refers to chemical compounds that contain the element chromium in the +6 oxidation state from electroplating and other sources, naturally occurring arsenic, radon, and uranium all of which can cause cancer⁽⁶⁾.

Material and methods:

Waters' samples (50) from different wells in Baghdad. The water samples were collected in clean glass bottles for chemical and microbial analysis and sent to private laboratory in order to identify heavy metals cadmium Cd, zinc Zn, chromium Cr copper Cu, mercury Hg, lead Pb and nickel Ni, arsenic AS, salts of magnesium Mg, calcium Ca and of bacteria as *E. coli*, *Salmonella* and parasites as round worm⁽⁷⁾⁽⁸⁾. Fifty(50)samples(1-2 cm) pieces of different organs from slaughtered animals; sheep, goat, cattle were supplied with wells' water, were sent to laboratory of histopathology in College of Veterinary Medicine University of Baghdad in order to preparing tissues slices⁽⁹⁾.

Statistical analysis.

Data were calculated as the arithmetic mean \pm S.D., The difference among groups was depend on ANOVA followed by *t* test. A value of $P < 0.05$ considered as statistically significant⁽¹⁰⁾.

Results and discussion:

Chemical analysis's of water samples showed that there were evidence of pollution of wells' water with different toxic substances as heavy metals (table-1) and bacterial pollution(table-2) and Parasitical pollution (table-3) which have significant differences according to control(distilled water) samples.



Table (1): chemical analysis of wells' water samples from different areas in Baghdad city.

Wells' water sample Baghdad city		Salts and metals (% \pm s.d)								
n=10	Cd	Zn	Cr	Mg	Ca	Cu	Hg	Pb	Ni	As
Al-Mahmodia	210 \pm 0.5	0.34 \pm 0.5	0.87 \pm 0.5	722 \pm 0.5	522 \pm 0.5	0.12 \pm 0.5	0.62 \pm 0.5	0.3 \pm 0.5	2.65 \pm 0.5	6.52 \pm 0.5
Abu-Grab	855 \pm 0.5	2.9 \pm 0.5	5.05 \pm 0.5	543.1 \pm 0.5	321 \pm 0.5	0.6 \pm 0.5	32.1 \pm 0.5	9.35 \pm 0.5	7.06 \pm 0.5	622 \pm 0.5
Youssefia	5.65 \pm 0.5	181 \pm 0.5	5872 \pm 0.5	654 \pm 0.5	723 \pm 0.5	1.90 \pm 0.5	2.32 \pm 0.5	5.17 \pm 0.5	672 \pm 0.5	3.22 \pm 0.5
Al-Altaji	3.88 \pm 0.5	56,2 \pm 0.5	5.3 \pm 0.5	422 \pm 0.5	5.60 \pm 0.5	43.2 \pm 0.5	7.76 \pm 0.5	6.32 \pm 0.5	8.65 \pm 0.5	65.84 \pm 0.5
Control	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0	0.0 \pm 0.0

The results showed significant differences from control at $p < 0.05$.

According to above results which were explained marked existences of toxic chemicals in the examined samples as comparison to control at significant difference $P < 0.05$ among different groups, this occurs in Iraqis' environment due to recurrent pollution of surface of earth and rivers and poorly sterilization for agriculture and traditional and public wasted such as swage further to residues of wares and military operation in Iraq during (1980-2014) and stilled holed in Iraq for this moments'. And these observations agreed with authors' opinions (11; 12; 13) as well as with authors (14; 15; 16).

Table (2): Tested for bacteria in wells' water samples from different areas in Baghdad city.

Wells' water sample Baghdad city n=10	Salmonella	Shigella	E coli
Al-Mahmodia,	0.53 \pm 0.2	0.41 \pm 0.1	0.06 \pm 0.5%
Abu-Grab	0.75 \pm 0.1	0.13 \pm 0.6	0.12 \pm 0.4
Al- Youssefia	0.51 \pm 0.3	0.32 \pm 0.2	0.17 \pm 0.6
Al-Altaji	0.28 \pm 0.1	0.34 \pm 0.2	0.38 \pm 0.5
Control	0	0	0

The results showed significant differences from control at $p < 0.05$.



According to above results which were explained marked existences of *salmonella* and *Shigella* and *E coli* in the examined samples as comparison to control at significant difference $P < 0.05$ among different groups contamination of wells' water with bacteria comes from wrong uses of organic and inorganic chemicals as vaccination and from unburied decomposed dead animals further to natural disaster effects or seas pollution with un treated medical residues due to mismanagement of environment which causes food and water poisoning for human and animals .That's ' agreed with (16;17;18;19).

Table (3): Tested for parasites in wells' water samples from different areas in Baghdad city.

Wells' water sample Baghdad city n=10	Round worms' larvae	Round worms' adults
Al-Mahmodia,	+	+
Abu-Grab	+	+
Al- Youssefia	+	+
Al-Altaji	+	+
Control	-	-

The results showed significant differences from control at $p < 0.05$.

According to above results which were explained marked existences of parasite in wells water samples^(16;20) as comparison to control at significant difference $P < 0.05$ among different groups. Parasitic contamination in wells' water occurred as results of poorly disinfectants methods in hospitals, factories and houses and mismanagements of anthelmintic drug (21). Current results are agreed with (22) who say that wells water contaminate with parasite which infects children with diarrhea and he's mentions that in 1989 it was estimated that the prevalence of diarrhea in children (under 5 years) was about 1.362 billion, of which 4.9 million died due to the diseases. Even if only 1/3 of these diarrhea cases were related to water, then more than 1.5 million of children under 5 died as a result of drinking contaminated water. Water related diseases are still prevalent and revolt. (22)

Histopathological results':

Histopathological investigation about the toxic effects of wells' water on different tissue of animals which drank on wells water showed that there was evidence of severe fatty changes like vacoulation with focal necrotic lesions on brain, liver, kidney tissues (**Figure 1- A.B.C**).

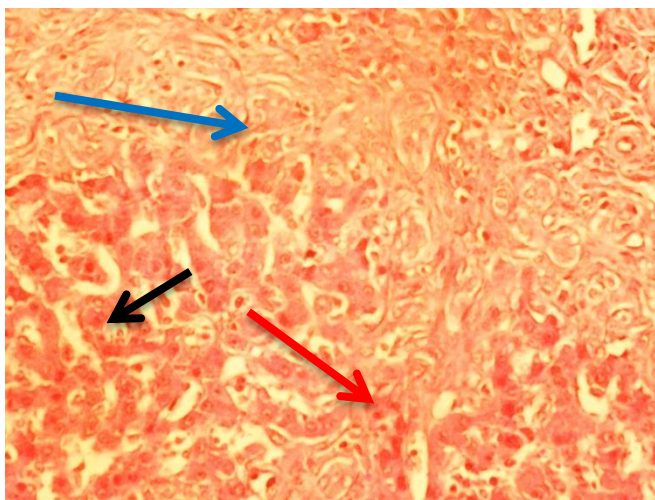


Figure 1- A: Histopathological section in the liver of sheep: showed fatty degeneration like vacuolation (red arrow) and focal necrosis (black arrow) mixed with cellular infiltration associated mild intra septal fibrosis (blue arrow) H&E stain40X.

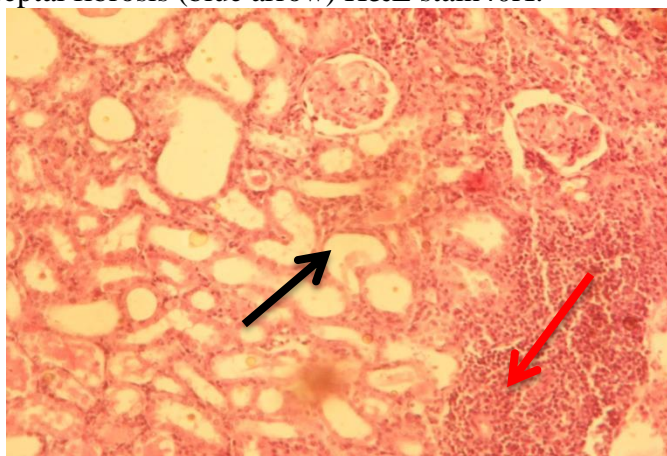


Figure 1- B: Histopathological section in the Kidney of sheep showed focal interstitial cellular infiltration (red arrow) with cellular swelling of tubular epithelial lining and others dilated and hemorrhage (black arrow) H&E 40X.

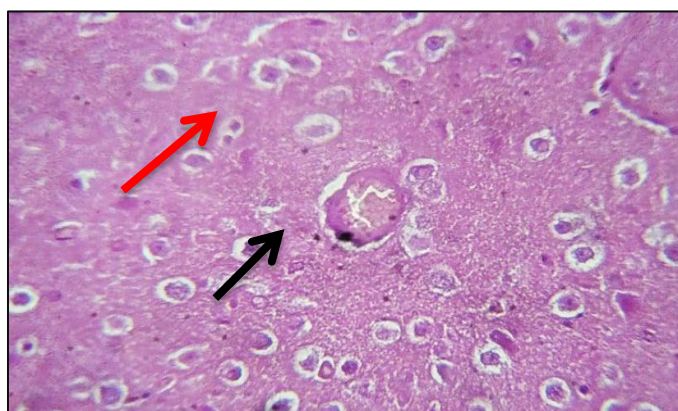


Figure 1- C: Histopathological section in the brain of cow: showed neuronal edema (red arrow) with liquefactive necrosis (black arrow). H&E stain 40X.

As well as degenerative changes on meats samples as muscles, gastrointestinal tract GIT and hemorrhagic changes on spleen with inflamed lymphoid follicles. Figure (2-A.B.C.D)

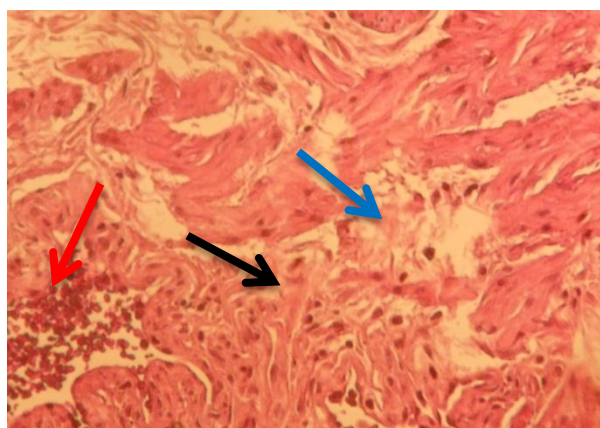


Figure 2-A Histopathological section in the muscle of calf with intramuscular cellular infiltration (black arrow) and hyalinization of muscular bundles (blue arrow) and hemorrhage (red arrow). H&E stain 40X.

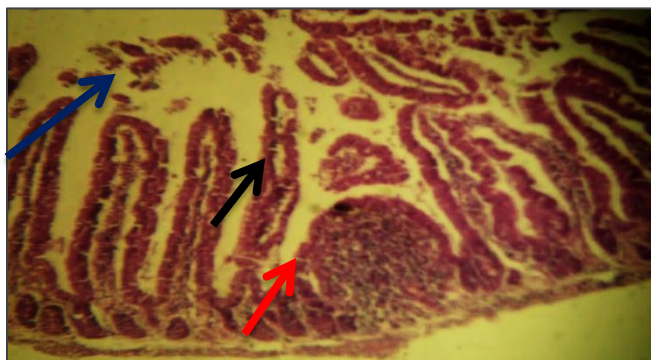


Figure 2-B: Histopathological section in the GIT of calf showed superficial sloughing of mucosa (black arrow) and cellular debris in the intestinal lumen (blue arrow) with inflamed **Peyer's patches** (red arrow). H&E stain 10X.

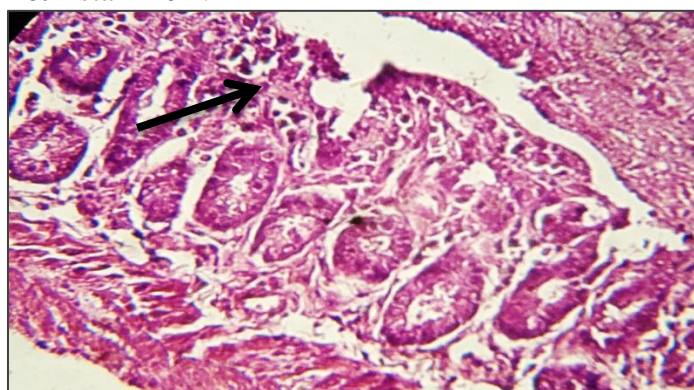


Figure 2-C Histopathological section in the GIT of cow showed degenerative change in submucosal glands surrounded with cellular infiltration. H&E stain 40X.

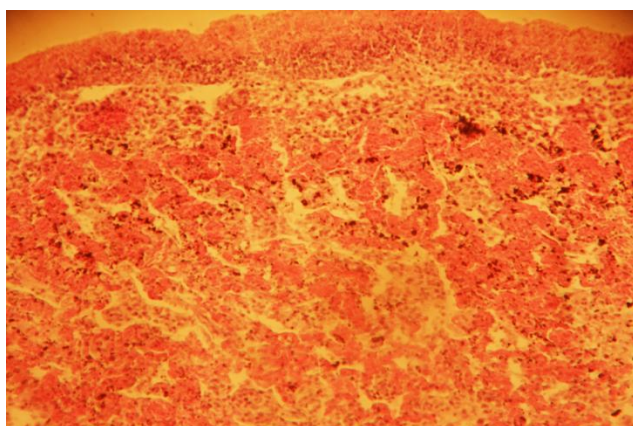


Figure 2-D Histopathological section in the spleen of sheep showed congestion of red pulp with cellular infiltration. H&E stain 40X.



Pollution of wells' water with toxic and harmful chemicals and different pathogens(bacteria; parasites) which are affects different organs of animals and causes different degree of degenerative changes(lesions) and responsible for losing of the special appearance and taste of meat and so may be causes sudden death to animals. from accumulation of these compounds in organs. Pathological investigation on tissue such as fatty degeneration and necrosis with inflammatory infiltration and fibrotic lesions in internal organs with neuronal degenerative changes and gastrointestinal tract above finding are agreed with (23, 24, and 25). Others authors reveal that water of wells can offer poisoning signs in human being directly by consumption water or indirectly by consumption animals' production such as milk and meat. (26)

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