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Chemical, Physical and microbial appraisal of bottled water in Iraq

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Abstract

There has been a growing concern about the quality of bottled water; in as much to the increased bespoke of-this product so to evaluate the quality of bottled water in local markets in Baghdad, This study was investigated. Fifteen types of bottled water were chosen randomly from local markets for analyses. Physical, chemical and microbial properties of all samples were appraised comprising turbidity, PH, concentration of Ca, Mg, Cl, Pb, total bacteria counts, total coliform count, fecal coliform, E.coli and protozoa. The results obtained were compared with the world health organization for drinking water and the standard specification for Iraqi drinking water. The turbidity for all samples was less than 1(NTU). The range of the PH value was (7.5-8.5) Concentration of Ca, Mg, Cl, Pb were (0.1604-9.223), (0.117-14.009), (2.9-21.9), (0.047-0.589) mg/L. respectively all the samples were within the limits of the standard specification for Iraqi drinking water expect the percentage of Pb was high, and absence of bacteria coliform, E.coli in all samples while a few of protozoa was noticed.

Key words: Physical analysis, chemical analysis, microbial analysis, bottled water.

الخلاصة

اجريت هذه الدراسه لتقييم مياه القناني المعبأه في بغداد بسبب ازدياد الطلب عليها والحاجه لتقييم نوعية هذه المياه. تم اخذ ١٥ نموذج بصوره عشوائيه من مياه القناني المعبأه المطروحه في الاسواق المحليه لمدينة بغداد واجريتها عليها مجموعه من الفحوصات الفيزياويه والكيمياويه والمايكروبيه مثل فحص الحموضه والعكوره و تقدير بعض العناصر مثل الكالسيوم، المغنيسيوم، الكلور و الرصاص اجريَ العد الكلي للبكتيريا، والعد الكلي لبكتريا القولون البرازيه، بكتيريا الامعاء الغليظه والابتدائيات. تم مقارنة النتائج مع المواصفه القياسيه العراقيه ومواصفة منظمة الصحه العالميه وكانت العكوره لجميع النماذج اقل من ١ (NTU) وتراوحت الحموضه بين ٧.٥-٨.٥ اما نسبة العناصر للكالسيوم، المغنيسيوم، الكلور والرصاص (0.1604-9.223), (0.117-14.009), (2.9-21.9), (0.047-0.589) ملغم/لتر على التوالي وكانت نسبة العناصر مقاربه الى النسبه المذكوره في

المواصفه القياسيه العراقيه ما عدا نسبة الرصاص فقد كانت مرتفعه وكانت جميع النماذج خاليه من البكتريا وظهرت بعذ انواع الابتدائيات في بعض النماذج.

Introduction

Good quality of water is the key to increase human productivity for long life [1]. Safe drinking water is primal proves for human life [2]. Due to the increased request of bottled water in Iraq, there has been anxiety about the quality of this product. The degeneration of water quality initially consist microbiological dangers. Since the majority of evident water related health problems are the result of microbial contamination [3]. An augment worldwide concern about the quality of bottled water as to their chemical contents has risen [4]. Water quality can be fated by names of its concentration organic and inorganic chemicals. Some minerals are required by our bodies for several biological and needful for the fending of health [5]. Trace elements forming only a small part of the total food up take but many studies have shown a strong connection between several human disease and the attend of trace elements in drinking water [6].

Experimental

Apparatus

Atomic Absorption (Shimadzu, Japan, AA-7000)
Turbidity meter (MARTINI MI415, Romania)
PH-meter (USA, ph starter 2000)
Incubator (Binder, USA)
Light Microscope (Optika, ITALY)

Sample collection

Bottles of water were collected from various retail loopholes in Baghdad. Bottles were opened in the laboratory and casting immediately into factory new bottles.

Chemical and physical analysis

Waters were analyzed for PH using PH meter, turbidity by turbidity meter [7]. Tow samples were collected one was acidified with 2% HNO3 for the analysis of Pb by atomic absorption. The second was left acidified for the analysis of Ca and Mg by atomic absorption [8]. While Cl using a laboratory traitor [9].

Evaluate the microbial quality

In order to evaluate the microbial quality of bottled water (15) samples were selected the samples were collected from different local market in Baghdad samples were taken to the microbial laboratory and analyzed same day. A total of 15 bottled

water samples collected and analyzed for total bacteria count, E.coli, fecal coliform count and total count [10-11], Protozoa were determinate by light microscope.

Results and Discussion

Physical properties:

PH:

PH values for bottled water according to table (1) are between (7.4-8.4) High PH values can promote hardness scale precipitation and make chlorine disinfectants more effective [12].

Table (1): PH results of samples

Samples name	PH Value
Nawar / Iraq	7.9
Pearl / Iraq	8.1
Wafr / Iraq	7.4
Jawhara / Iraq	8.0
Rawdatain / kuwait	7.7
Life / Iraq	8.1
Ala / Iraq	8.3
Wafi / Iraq	7.7
Ssad / Iraq	7.9
Royal / Iraq	8.1
Hadeer / Iraq	7.8
Alwaha / Iraq	8.3
Wadi Mina / Iraq	8.4
Veneza / Iraq	8.3
Aljnaen / Iraq	7.8
The standard specification for Iraqi drinking water	(6.5 – 8.5)
World Health Organization	(7 – 8.5)

Turbidity:

Was measured the result showed in table (2) it was less than 1 NTU for all samples according to the standard specification for Iraqi drinking water and WHO the maximum level of turbidity for drinking water is (5) NTU [13]. The appearance of water is usually acceptable to consumers.

Table (2): Turbidity of bottled water

Samples name	Turbidity Value
Nawar / Iraq	0.00 NTU
Pearl / Iraq	0.06 NTU
Wafr / Iraq	0.64 NTU
Jawhara / Iraq	0.00 NTU
Rawdatain / kuwait	0.11 NTU
Life / Iraq	0.00 NTU
Ala / Iraq	0.00 NTU
Wafi / Iraq	0.00 NTU
Ssad / Iraq	0.00 NTU
Royal / Iraq	0.00 NTU
Hadeer / Iraq	0.25 NTU
Alwaha / Iraq	0.05 NTU
Wadi Mina / Iraq	0.04 NTU
Veneza / Iraq	0.06 NTU
Aljnaen / Iraq	0.00 NTU
The standard specification for Iraqi drinking water	(5 NTU)
World Health Organization	(5 NTU)

Chemical test:

Elements:

The concentration of Ca, Mg, Cl, Pb in bottled water were analyzed by atomic absorption as shown in the experimental section. The result is shown in table (3). All samples brands had Ca, Mg, Cl levels less than the specification for Iraqi drinking water. On the contrary a number of studies have suggested that water hardness may protect against disease [14]. While the level of (Pb) was high lead is a highly toxic metal. Its adverse health effects include various cancers, adverse reproductive outcomes cardiovascular and neurological disease (15).

Table (3): The concentration of Elements in bottle water

Sample	Ca (mg/L)	Mg (mg/L)	Pb (mg/L)	Cl (mg/L)
Nawar / Iraq	5.486	4.1659	0.0471	13
Pearl / Iraq	0.0525	0.2531	0.1203	Nil
Wafr / Iraq	0.7340	0.4895	0.5895	5.6
Jawhara / Iraq	5.504	6.0895	0.0867	7
Rawdatain / Kuwait	9.223	8.9757	0.2258	12
Life / Iraq	6.397	9.3233	0.2960	5
Ala / Iraq	8.146	10.4915	0.1167	2.9
Wafi / Iraq	0.4616	0.5535	0.3464	2.9
Ssad / Iraq	0.3328	0.1970	0.1993	2.8
Royal / Iraq	0.2021	0.7123	0.2816	21.9
Hadeer / Iraq	5.325	4.5731	0.3272	11
Alwaha / Iraq	2.031	14.0099	0.3442	6.8
Wadi Mina / Iraq	7.328	5.1343	0.2330	3
Veneza / Iraq	0.0847	0.1174	0.2213	2.9
Aljnaen / Iraq	0.1604	0.3978	0.2840	3.3
The standard specification for Iraqi drinking water	50	50	0.05	250

Bacterial investigation:

None of the samples were contaminated with bacterial.

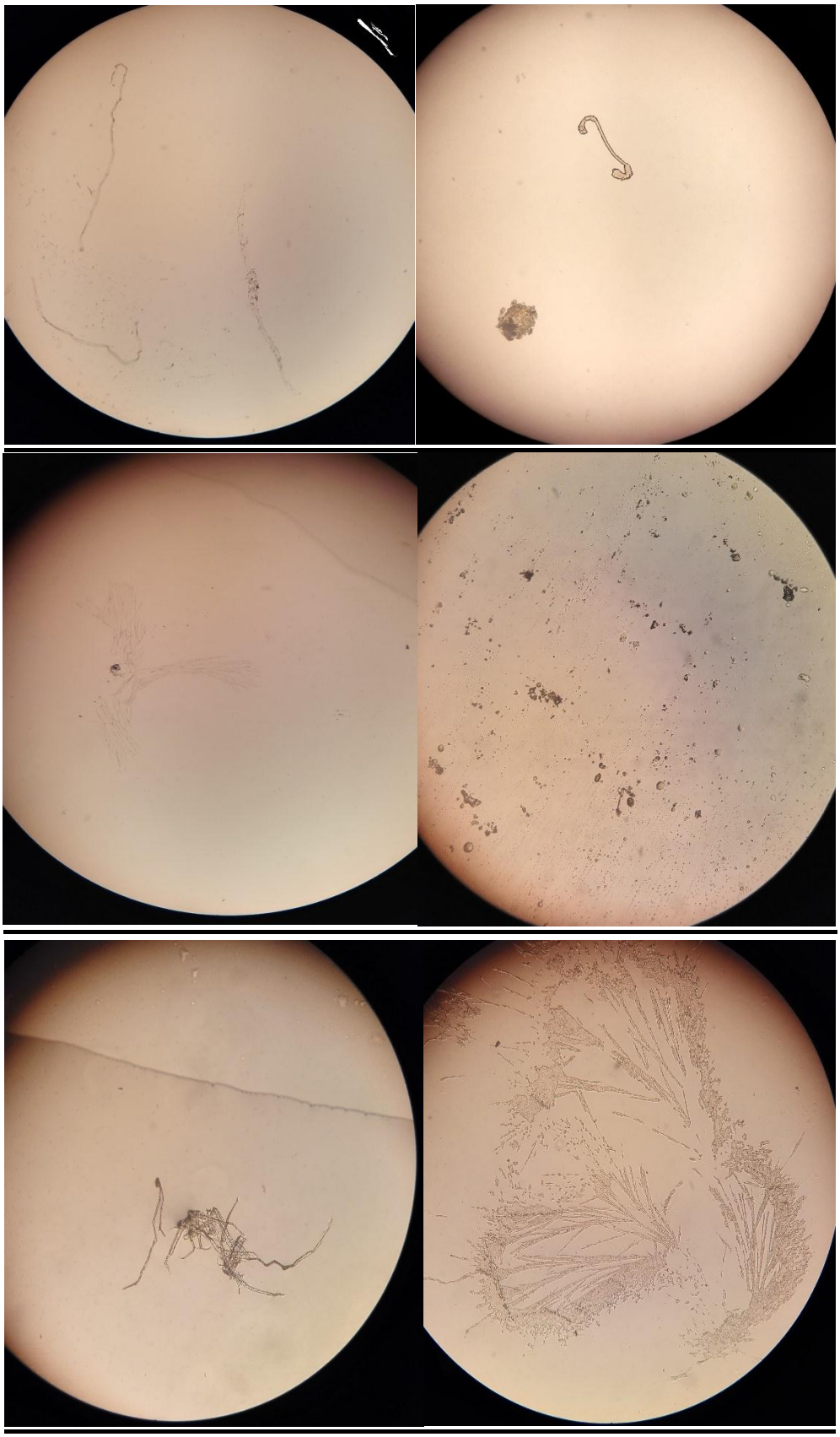
protozoa investigation

The contain of protozoa in bottled water was except same samples like (Wafi, Rawdatain, Wadi Mina) the level of was high. As show in Fig (1).

Conclusion

When we compared the bottled water and the drinking water we can notice that bottled water is not more safety than tap water (drinking water).

Fig (1): Some Kind of protozoa



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