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Article

Bacteriological assessment of tap water collected from different markets of Mymensingh, Gazipur and Sherpur districts of Bangladesh with special focus on the molecular detection and antimicrobial resistance of the isolated *Escherichia coli*

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Abstract: The objectives of this study were to assess the bacteriological quality of tap water samples obtained from different markets of different upazillas of Mymensingh, Sherpur & Gazipur district. For achieving the above mentioned objectives, methods of heterotrophic plate count (HPC) and total coliform count (TCC) were applied. Moreover, isolated *E. coli* from tap water samples were characterized by using biochemical test, molecular method and antimicrobial susceptibility tests. HPC was highest in market tap water collected from Kaligonj and TCC was highest in market tap water of collected from Mymensingh sadar. The geometric mean of HPC of Mymensingh, Gazipur and Sherpur districts water was $8.4x10^5$, $2.5 x10^6$ and $6.8 x10^5$ C.F.U/100 ml. All isolates of *E. coli* (n=20) were amplified by using 16S rRNA gene based PCR. In respect to antimicrobial susceptibility testing, most of the *E. coli* isolates were susceptible to norfloxacin, ampicilin, tetracycline, streptomycin and ciprofloxacin. Furthermore, a few *E. coli* isolates were intermediate resistant to gentamycin and ciprofloxacin. However, a few of the *E. coli* isolates were resistant to erythromycin and amoxycilin. Moreover, out of 20 *E. coli* isolates 3 (15%) isolates were detected as multidrug resistant. This study indicated the presence of multidrug resistant *E. coli* isolates in tap water in Mymensingh, Sherpur and Gazipur districts that warrants particular attention.

Keywords: bacteriological safety assessment; tap water; *E. coli*; antimicrobial resistance; PCR

1. Introduction

According to the World Health Report (2002), every year more than 3.4 million people die as a result of water related diseases indicating these as the leading cause of disease and death around the world. In the disease-prone, humid, tropical region of Bangladesh, outbreaks of diarrheal diseases, often on an epidemic scale, are not unusual and the possible role of water-borne pathogens in these outbreaks has been emphasized. Among waterborne diseases of bacterial origin typhoid fever, bacillary dysentery and diarrhea are common in Bangladesh (Islam *et al.*, 2010). Despite the availability and promotion of the use of safe water sources, water-related diseases remain an important cause of mortality and morbidity in Bangladesh and it is suggested that intake of contaminated water acts an important mode of pathogen transmission (Kabir *et al.*, 2015). Even if disinfection is practiced in water supply systems, but failure of the disinfection system due to poor management could result in serious health hazards and post contamination.

It is estimated that the 1% of drinking water is getting polluted with various organic and inorganic matters. The

organic matters which are responsible for the contamination of water are fecal wastes of poultry and livestock farms, pesticides, herbicides, and many industrial wastes, minerals and biological agents such as bacteria, virus, fungus, algae etc. Enterobacteriaceae in the water of river Manzanares at Cumana (Venezuela) and a high degree of enteric species of organisms was present in water (Mieres and Bastardo, 1975).

Chemical contaminants of the most of the water sources are man-made. In urban area the major contaminants that contribute to chemical contamination of the water sources include industrial effluents, sludge from sewage treatment plants, raw untreated sewage from urban populations and industry, suspended solids, biodegradable organics, pathogens, priority pollutants, refractory organics, heavy metals and dissolved inorganics (Chatterjee *et al.*, (2005). In rural area water pollution is also caused by silts and other suspended solids such as soil, wash off plowed fields, agriculture run-offs, and eroded river banks when rains, sewage and wastes of houses (Kabir *et al.*, 2015).

In China, about 90% of surface waters and over 60% of drinking water sources in urban areas have been polluted by different extents of organic substances, ammonia nitrogen, phenols, pesticides and pathogenic microorganisms (Wang *et al.*, 2000). In South Asian countries, rivers such as in the Kathmandu valley, the Yamuna River at Delhi, and peripheral rivers (mainly Buriganga River) of Dhaka was more severely polluted by urban activities destined to unplanned urbanization and industrialization, inadequate sewerage, and lack of effective pollution control measures (Karn *et al.*, 2001).

The World Health Organization has estimated that up to 80% of all sickness and disease in the world is caused by inadequate sanitation, polluted water or unavailability of water. It was estimated that nearly 1.5 billion people lack safe drinking water and that at least 5 million deaths per year can be attributed to water-borne disease. Health effects associated with water supplies in developing countries are evaluated to be based on four bacterial indicators of tropical drinking-water quality (faecal coliforms, *Escherichia coli*, Enterococci and faecal Streptococci) and their relationship to the prevalence of diarrhoeal disease in Cebu, Philippines (Moe *et al.*, 1991). The contaminated water or inadequate supply of safe drinking water causes various gastrointestinal diseases like diarrhoea, dysentery and water-borne diseases like cholera, typhoid. It is now evident that most of the enteric diseases of human and animals are transmitted through contaminated food and water (Johnson *et al.*, 2003). So to get rid from suspended biological agents and to ensure the supply of pure drinking water, water must need prior treatment or purified before consumption.

From this view point of public health, it is highly imperative that potable water supply system should be safe. Water may be polluted at its sources by excreta or sewage, which is almost certain to have pathogenic microorganisms. Potable water system can become polluted with coli form and pathogenic bacteria due to lack of hygiene and sanitation. As a result, microbiological examination of water should routinely be carried out to monitor and control the quality and safety of drinking water. Although the concept of safe water is under consideration in Bangladesh, unfortunately science-based little information is available. Therefore, the present study was conducted to determine the bacteriological quality, molecular detection and antibiotic sensitivity of isolated *E. coli* of tap water collected from different market of different upazilla of Mymensingh, Gazipur, Sherpur districts.

2. Materials and Methods

2.1. Collection and transportation of samples

A total of 20 tap water samples were collected in sterile glass bottles from different upazilas of Mymensingh, Gazipur and Sherpur district of Bangladesh and transported to the laboratory in ice box containing ice freezer packs. From each sampling point, 250 ml samples were taken for analyses. The bacteriological tests were undertaken within 6 hours after collection to avoid the growth or death of microorganisms in the sample. With regard to the bacteriological analysis, water samples were collected, labeled and transported to the Microbiology laboratory of Bangladesh Agricultural University.

2.2. Heterotrophic plate count (HPC)

For the determination of heterotrophic plate count, 100 µl of serial tenfold dilution of tap water samples were transferred and spreaded on plate count agar media using micro pipette for each dilution. The diluted samples were spreaded as quickly as possible on the surface of plate count agar with a sterile glass spreader. One sterile glass spreader was used for each plate. The plates were then taken in an incubator at 37ºC for 24 hours. After incubation at 37ºC for 24 hours plates exhibiting 30-300 colonies were counted. The average number of colonies in a particular dilution was multiplied by the dilution factor to obtain the heterotrophic plate count (HPC). The heterotrophic plate count was calculated according to ISO (1995). The result of total bacterial count was expressed as the number of organism or colony forming units per milliliter (C.F.U/ml) of water samples.

2.3. Total coliform count

The most probable number (MPN) test for water examination for the presence of coliforms was performed according to the procedures described by Harley and Prescott (2002). An estimate of the number of coliforms (Most Probable Number) can also be done in the presumptive test. In this procedure, 15 lactose broth tubes were inoculated with the water samples. Five tubes received 10 ml of water, 5 tubes received 1ml of water, and 5 tubes received 0.1ml of water. A count of the number of tubes showing gas production was then made, and the figure was compared to a table developed by American Public Health Association. The number was the most probable number (MPN) of coliforms per 100 ml of the water sample.

2.4. Detection of fecal coliforms

The positive presumptive cultures were transferred to lactose broth, which is specific for fecal coliform bacteria. Any presumptive tube which showed gas production after 24 (+/ 2) hours incubation at 44.5°C (+/ 0.2°C) confirmed the presence of fecal coliform bacteria in that tube and was recorded as a positive confirmed tube.

2.5. Isolation and identification of *E. coli*

The bacteriological examination followed detail study of colony characteristics including the morphological and biochemical properties. In order to find out different types of microorganisms in samples well isolated individual of bacterial colonies were fished out in pure culture from the EMB and MacConkey agar subsequently identified according to the Bergan's manual of determinative bacteriology (1984). Gram's staining was performed to determine the size, shape and arrangement of bacteria. Gram's staining reaction was performed according to the methods described by Merchant and Packer (1976). The organism if *E. coli* revealed gram-negative, pink color, large rod shape appearance, arranged in single or paired. The isolated organisms with supporting growth characteristics on various media were subjected to different biochemical tests; sugar fermentation test for acid or acid and gas, indole production test, Motility tests, methyl-red and Voges-Proskauer (VP) test. In all cases standard methods as described by Cowan (1985) were followed for conducting these tests.

2.6. Molecular identification by polymerase chain reaction (PCR)

Bacterial DNA template was prepared by using boiling method (Englen and Kelley, 2000). All the samples were examined by two pairs of primers (Table 1) to detect 16S rRNA gene of *E. coli.* In case of *E. coli*, the PCR reactions were carried out using a thermocycler (ASTEC, Japan) with the following programme: initial denaturation with 1 cycle of 5 min at 95°C, 30 cycles each consisting of denaturation with 45 sec at 94°C, annealing with 45 sec at 52°C, extension with 1 min at 72 °C and a final extension step of 5 min at 72 °C. PCR products were separated on 2% agarose (Invitrogen, USA) gel, stained with ethidium bromide and photographed using a gel documentation system (BioRad).

2.7. Antibiotic sensitivity test

All *E. coli* isolates were tested against eight commonly used antibiotics (HiMedia, India) by the method of disk diffusion as described by Bauer *et al*. (1966). For this purpose, eight different antibiotic discs were obtained from commercial sources (Himedia, India). The selected antibiotics used were ciprofloxacin (5 µg/disc), azithromycin (30 µg/disc), amoxicillin (30 µg/disc), gentamicin (10 µg/disc), norfloxacin (10 µg/disc), erythromycin (30 µg/disc), streptomycin (10 µg/disc), and tetracycline (30 µg/disc). The interpretation on susceptibility was done according to the guidelines of Clinical and Laboratory Standard Institute (CLSI, 2007).

2.8. Statistical analysis

The data on heterotrophic plate count (HPC) and Total coliform count (TCC) obtained from the bacteriological examination of tap water collected from different selected upazila of Bangladesh were analyzed in completely randomized design (CRD) using computer package subjected to Analysis of Variance using SPSS Software (Version 16, 2007). The differences between means were evaluated by Duncan's Multiple Range Test (Gomez and Gomez, 1984).

Table 1. Primers used in PCR for *E. coli.*

Primers	Sequence (5'-3')	Target	Amplicon size (bp)	Reference
ECO-1	GACCTCGGTTTAGTTCACAGA	*E. coli*	585	Schippa *et al.,* 2010
ECO-2	CACACGCTGACGCTGACCA	16S rRNA gene		

3. Results

3.1. Results of bacteriological assessment

3.1.1. Heterotrophic plate count (H.P.C)

The geometric mean of Heterotrophic Plate Count (H.P.C) of tap water samples of Mymensingh district was $8.4x10^5$cfu /ml (Table 2). The heterotrophic plate count (H.P.C) of tap water in Mymensingh district having sample code TW1, TW2, TW3, TW4, TW5, TW6, TW7, TW8, TW9, TW10 were $3.5x10^6$, $4x10^6$, $3x10^4$, $2x10^4$, $2x10^4$, $3.0x10^4$, $6.5x10^5$, $12x10^{3,}$ $20x10^{4,}$ $3x10^4$ C.F.U /ml respectively. In Mymensingh district, highest Heterotrophic Plate Count (H.P.C) count was found in water of Muktagacha and the value was 4×10^6 C.F.U /ml and the lowest count was in Tarakanda and the count was 12×10^3C.F.U /ml.

In case of Gazipur District, highest HPC count was found in Tap water of TW12 and the count was 6.5×106 C.F.U /ml. and the lowest count was in Tap water of TW14 and the count was 8×10^5 C.F.U /ml. Average Heterotrophic Plate Count (HPC) count in Gazipur was 2.5×10^6 C.F.U /ml (Table 2). The HPC count of tap water samples having sample code TW11, TW12, TW13, TW14, TW15 were 2.5×10^6 C.F.U/ml, 6.5×10^6 C.F.U/ml, 1.6×10^6 C.F.U/ml, 8×10^5 C.F.U/ml, 12×10^5 C.F.U /ml respectively.

In Sherpur tap water were samples were examined. The HPC count of tap water samples having sample code TW16,TW17,TW18,TW19,TW20 were 1.3×10^6 C.F.U/ml, 15.6×10^5 C.F.U/ml, 5×10^4 C.F.U /ml, 3×10^4 C.F.U/ml, 4×10^4 C.F.U/ml respectively. Highest count was found in TW16 and that was 1.3×106 C.F.U /ml and lowest count was found in TW19 and that was 3×10^4 C.F.U /ml .Average heterotrophic plate count (HPC) count in Sherpur districts was 6.8×10^5 C.F.U /ml (Table 2).

3.1.2. Total coliform count (TCC)

The summary of total coliform count (TCC) of tap water of Mymensingh, Gazipur and Sherpur district is presented in Table 2. In case of Mymensingh district, lowest coliforms was found in tap water TW4, TW8, TW10 and the concentration was 7 coliforms/100 ml water samples. Highest number of coliforms was found in TW1. The TCC of tap water sample having sample code TW1, TW2, TW3, TW4, TW5, TW6, TW7, TW8, TW9 and TW10 were 70 colifroms/ 100 ml, 21 coliforms/100 ml, 14 coliforms/100 ml, 7 coliforms/100 ml, 11 coliforms/100 ml, 9 coliforms/100 ml, 14 coliforms/100 ml, 7 coliforms/100 ml, 17 coliforms/100 ml & 7 coliforms/100 ml water respectively.

In case of Gazipur district, highest coliforms were found in tap water TW13 and the concentration was 23 coliforms/100 ml water samples. Lowest number of coliforms was found in TW12 water samples and result was 13 coliforms/100 ml water. The TCC of tap water samples having sample code TW11, TW12, TW13, TW14, TW15 were 17 colifroms/ 100 ml, 13 coliforms/100 ml, 23 coliforms/100 ml, 17 coliforms/100 ml, 14 coliforms/100 ml water respectively.

In case of Sherpur Districts, highest coliforms was found in TW16 and the concentration was 13 coliforms/100 ml water sample. Lowest number of coliforms was found in TW17 & TW20 water samples and result was 7 coliforms/100 ml water. The TCC of tap water samples having sample code TW16, TW17, TW18, TW19, TW20 were 13 coliforms/ 100 ml, 7 coliforms/100 ml, 11 coliforms/100 ml, 9 coliforms/100 ml, 7 coliforms/100 ml, water respectively.

Table 2. The summary of HPC and TCC of tap water of Mymensingh, Gazipur and Sherpur district.

Source of sample	Sample code	HPC (CFU/ml)	Geometric mean of HPC (CFU/ml)	T.C.C by MPN Method (coliforms/100ml)	Fecal Coliforms
Mymensingh	TW1	$3.5x10^6$ CFU/ml	8.4×10^5	70 coliforms/100ml	-ve
	TW2	$4x10^6$ CFU/ml		21 coliforms/100ml	+ve
	TW3	$3x10^4$ CFU/ml		14coliforms/100ml	-ve
	TW4	$2x10^4$ CFU/ml		7 coliforms/100 ml	-ve
	TW5	$2x10^4$ CFU/ml		11 coliforms/100 ml	-ve
	TW6	$3.0x10^4$ CFU/ml		9 coliforms/100 ml	-ve
	TW7	$6.5x10^5$ CFU/ml		14 coliforms/100 ml	-ve
	TW8	$12x10^3$ CFU/ml		7 coliforms/100 ml	-ve
	TW9	$20x10^4$ CFU/ml		17 coliforms/100 ml	-ve
	TW10	$3x10^4$ CFU/ml		7 coliforms/100 ml	-ve
Gazipur	TW11	$25x10^5$ CFU/ml	2.5×10^6	17coliforms/100ml	-ve
	TW12	$6.5x10^6$ CFU/ml		13 coliforms/100ml	+ve
	TW13	$1.6x10^6$ CFU/ml		23coliforms/100ml	-ve
	TW14	$8x10^5$ CFU/ml		17 coliforms/100 ml	-ve

Source of sample	Sample code	HPC (CFU/ml)	Geometric mean of HPC (CFU/ml)	T.C.C by MPN Method (coliforms/100ml)	Fecal Coliforms
	TW15	$1.2x10^6$ CFU/ml		14 coliforms/100 ml	-ve
Sherpur	TW16	$1.3x10^6$ CFU/ml		13 coliforms/100ml	-ve
	TW17	$15.6x10^5$ CFU/ml		7 coliforms/100ml	-ve
	TW18	$5x10^4$ CFU/ml	6.8×10^5	11coliforms/100ml	-ve
	TW19	$3x10^4$ CFU/ml		9 coliforms/100 ml	-ve
	TW20	$4x10^4$ CFU/ml		7 coliforms/100 ml	-ve

3.2. Results of isolation and identification of *E. coli* from tap water

A total of 20 *E. coli* strains were isolated from 20 tap water samples by using cultural and biochemical techniques.

3.3. Confirmation of *E. coli* by 16S rRNA gene by PCR

DNA extracted from *E. coli* isolates was used in the PCR assay. PCR primers targeting 16S rRNA gene of *E. coli* amplified 585 bp fragments of DNA confirmed the identity of *E. coli* result of PCR for *E. coli* is shown in Figure 1.

3.4. Results of antibiogram study

3.4.1. Results of antimicrobial susceptibility of *E. coli* isolates

The results of the antimicrobial susceptibility testing by disc diffusion method with 8 chosen antimicrobial agents are presented in Table 3. Out of 20 *E. coli* isolates, 4 (20%) were resistant to erythromycin and 3(15%) were resistant to amoxycillin, 1(5%) were resistant to tetracycline, 2(10%) were resistant ciprofloxacin. Furthermore, 2(10%) were intermediate resistant to norfloxacin. On the other hand, 18(90%) were susceptible to azithromycin and ciprofloxacin and 17(85%) were susceptible to gentamicin.

Table 3. Results of antimicrobial susceptibility of the isolated *E. coli* from tap water.

Name of isolates	No. (%)							
***E. coli* (n=20)**	**AMO**	**CN**	**TE**	**E**	**AZM**	**S**	**CIP**	**NOR**
Susceptible	16 (80)	17 (85)	18 (90)	12 (60)	18 (90)	18 (90)	17 (85)	17 (85)
Intermediate	2 (10)	1 (5)	1 (5)	4 (20)	1 (5)	1 (5)	1 (5)	2 (10)
Resistant	2 (10)	2 (10)	1 (5)	4 (20)	1 (5)	1 (5)	2 (10)	1 (5)

[Amoxycilin (AMO), Tetracycline (TE), Erythromycin (E), Azithromycin (AZM), Streptomycin (S), Gentamycin (CN), Ciprofloxacin (CIP), Norfloxacin (NOR)]

3.4.2. Results of antimicrobial resistance pattern of *E. coli* isolates

The results of antimicrobial resistance pattern of *E. coli* isolates are summarized in Table 4. Out of 20 *E. coli* isolates, 11 (55%) were resistant to each of 1 antibiotics, in where 2 (10%) were resistant to each of 2 antibiotics, 1(5%) were resistant to each of 3 antibiotics. From this analysis it was evident that 3 (15%) *E. coli* isolates were multidrug resistant when considered resistant to 2 or more drugs.

Table 4. Results of antimicrobial resistance pattern of *E. coli* isolates.

Isolates	Resistance profiles	No. of isolates (%)
	No resistance demonstrated	9
	Resistant to 1 agent (E)	4 (20)
	Resistant to 1 agent (AMO)	3 (15)
E. coli (n=20)	Resistant to 1 agent (NOR)	1 (5)
	Resistant to 2 agent (E-S)	1 (5)
	Resistant to 2 agent (AZE-CIP)	1 (5)
	Resistant to 3 agent (TE-E-S)	1 (5)
	Resistant Isolates	11 (55)

[Amoxycilin (AMO), Tetracyclin (TE), Erythromycin (E), Azithromycin (AZM), Streptomycin (S), Gentamycin (CN), Ciprofloxacin (CIP), Norfloxacin (NOR)].

4. Discussion

The objective of this research work was to assess the bacteriological quality of tap water samples collected from different upazilla markets of Mymensingh, Gazipur and Sherpur district. Heterotrophic plate count (HPC) and total coliform count (TCC) are commonly used to assess the general microbiological quality of tap water.

The geometric mean of HPC of Mymensingh, Gazipur and Sherpur districts water was 8.4x105, 2.5 x106 and 6.8 x105 C.F.U/100 ml. In this study, it was found that HPC was highest in market tap water collected from Kaligonj (Gazipur) and TCC was highest in market tap water of collected from Mymensinghsadar.

According to the world health report (2002), drinking water quality specifications world-wide recommend HPC limits from 100 to 500 cfu/ml in tap water. In this study, HPC was too high in case all types of tap water and high HPC measurements might be due to availability of favourable conditions for the bacterial growth in pipe system. The present study also revealed that tap water from different sources were contaminated with *E. coli* and other unidentified bacteria. A number of factors might be involved for such contamination. In Mymensingh the pipe system is very old and most of the pipes are poor in condition. There are leakage and breakage through which contaminants from outside the pipe might enter and get mixed with the supplied water. Due to lack of adequate water these pipes are often out of pressure. There is also an illegal practice of drawing water from pipes by suction. As a result, the pressure in the water main becomes less than the atmospheric pressure. Both of these phenomena might cause easier entrance of contaminants into pipelines. Moreover, due to improper layout of water supply lines and sewer lines there might be crossing between them. This might cause fecal contamination. Thus, it is very much possible that even if the water, while entering the pipes, satisfy the specification, it might no longer potable and palatable at the user's end. The findings of the present study correlate with the findings of Islam *et al.* (2010).

A total of 20 isolates were identified as *E. coli* on the basis of cultural and biochemical characteristics and 16S rRNA gene based PCR from tap water samples used in this study. The colony characteristics of the isolated *E. coli* in different media resemble the colony characteristics of *E. coli* as stated by Hamner *et al.* (2007). The fermentation reaction by the isolates of *E. coli* in five basic sugars (dextrose, sucrose, fructose, maltose, and mannitol) was positive. Moreover, MR reaction and catalase tests were also positive for *E. coli*. The organism was able to ferment lactose, dextrose and mannitol, sucrose and maltose completely. The result of sugar fermentation tests agreed with the findings of Sandhu*et al.* (1996). These respective authors reported that although *E. coli* ferments all 5 basic sugars but it partially fermented sucrose and maltose. Variation of the results might be due to genetic factors and nature of inhabitant of the organisms. Malaney and Weiser (1962) isolated *E. coli* from pond water. Dragas and Tratnik (1975) stated that 21.5% of water was contained *E. coli*. Lin *et al*. (1974) and Mieres and Bastardo (1975) isolated *E. coli* from river water. Johnson *et al.* (2003) detected *E. coli* and *Salmonella* in surface water. Abdel-Magid (1997) concluded that if the total coliform count becomes too numerous in water it should warrant more attention. Kravitz *et al.* (1999) found coliforms in all unimproved and semi-improved water sources and they considered these types of water as non-potable. They however found that *E. coli.* was absent in majority of the improved water sources. The findings of the present study obviously demonstrated that protection of water sources is very important and the avoidance of contamination can promote hygienic quality of water supplies, where disinfection is not possible. Nogueria *et al.* (2003) and Shelton *et al.* (2006) found fecal pollution of water samples. The findings of the present study correlate with the findings of Nogueria *et al.* (2003) who found highest load of coliform organism in tap water samples. Analogously Opara (2005) found coliform organisms in two rural communities and the quality of rural water supplied was found to be bacteriologically unsatisfactory. Recent studies of Shayo *et al.* (2007) obtained high coliform count in a rural district and overall, water supplies in the village. Campos *et al.* (2002) analyzed the microbiological quality of water samples collected from selected houses and could not detect coliforms. On the other hand, Vollared *et al.* (2005) reported that one third of the households, were significantly associated with water contaminated with >100 fecal coliforms /100 ml. They did not however found any association with water source or any environment was encountered. Campos *et al*. (2002) analyzed the microbiological quality of water samples collected from selected houses and found that total coliform count was absent.

E. coli is able to acquire resistance easily; therefore it is a good bioindicator model for surveillance studies of antimicrobial resistance. In antimicrobial susceptibility testing are in partial agreement with Islam *et al.* (2010) and Kabir *et al*. (2013).

A total of 20 *E. coli* isolates, 3(15%) were multidrug resistant. These findings are in partial agreement with Nazir *et al.* (2005). Thus, resistant strains might be emerged by genetic recombination against one or more antimicrobial agent(s).

5. Conclusions

The result validates the fact that the unhygienic and poor condition of tap water in studied areas and sanitary point of view and it has evidenced clearly the undesirable level of bacterial contamination such as *E. coli* which may have acquired from different sources. Detection of pathogenic *E. coli* in tap water samples revealed the fact that the water used in households may endanger public health.

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Conflict of interest

None to declare.

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