Table (7): **Biochemical reaction of *shigella***

Organism name	Glucose	Lactose	Maltose	Mannite	Sucrose	Indole	Methyl red	Voges proskaur	Citrate	Urea	H_2S	Motility
Shigella, dysenteriae	⊥	-	-	-	-	(V)	+	-	-	-	-	-
Shigella, flexneri	⊥	-	-	⊥	-	(V)	+	-	-	-	-	-
Shigella sonnei	⊥	(⊥)	-	⊥	-	-	+	-	-	-	-	-

\+ = Positive reaction
⊥ = Sugar fremented with no gas.
(V) = Variable result

The study also showed that the mean presumptive count for 4 water samples out of 40 chlorinated water samples was (0-10). For under ground water samples, the mean presumptive counts in 24, 8 and 13 water samples were 0-10, 10-100 and 100-200 respectively (Table 13, 14).

Bacteriological study of chlorinated and underground water samples for both *faecal streptococci* and *C. perfringens* showed that only 6 samples from the rural villages were containing *feacal streptococci* ;2 samples were from rural taps and 4 samples from rural hand pumps, and both chlorinated and underground water samples, were found to be free from *C. perfringens.*

b- Results of bacteriological examination of water samples for pathogenic organisms:

All the collected water samples from Benha city and the surrounded rural villages were bacteriologically examined for detection of pathogenic organisms: *samlonellae, shigellae, and vibrios.*

The study showed that only (1) sample from rural hand pump out of 100 contain *salmonella para typhi B (S.P.B)* and the rest of all collected water samples from both chlorinated and underground water showed negative result for *salmonellae, shigellae,* and *vibrios* (Table 15).

C- Results of bacteriological examination of water samples for *Aeromonas SPP.*

Bacteriological analysis of 40 water samples out of 100 samples collected from Benha city and the surrounded rural villages were carried up for detection of *Aeromonas* using membrane filter method. This study revealed negative results for *Aeromonas* Spp.

Table (8): Frequency of pollution in 40 chlorinated water samples from Benha city.

Source of samples	No. of samples	No. of polluted samples	%
Main source	**4**	**0**	**0**
Reservoirs	**13**	**1**	**7.6**
Public taps	**23**	**3**	**13.1**
Total	**40**	**4**	**10**

* Pollution in reservoir water samples (7.6%) is higher than that of public taps (13.1%).

Table (9): Frequency of pollution in 60 underground water samples from rural areas.

Source of samples	No. of samples	No. of polluted samples	%
Storage tanks	**5**	**0**	**0**
Rural hand pumps	**30**	**14**	**46.6**
Rural taps	**25**	**7**	**28**
Total	**60**	**21**	**35**

* Pollution in rural hand pumps samples (46.6%) is higher than that of rural taps (28%).

Table (10): Frequency of pollution in both chlorinated and underground water samples.

Source of samples	Chlorinated water		Underground water		Z	P
	No.	%	No.	%		
Main sources	0	0	0	0		
Final outlet	4	10	21	35	2.001	* <0.05

* Significant difference ($P < 0.05$).

Table (11): Pattern of pollution in 40 chlorinated water samples from Benha city.

Source	No. of tested samples	Typical (confirmed E. coli)		Atypical		Total	
		No.	%	No.	%	No.	%
Main source	4	0	0	0	0	0	0
Reservoir	13	0	0	1	7.6	1	7.6
Final outlet (public taps)	23	0	0	3	13.1	3	13.1
Total	40	0	0	4	10	4	10

* Pollution in chlorinated water samples mainly by atypical coliforms.
* Pollution by atypical coliforms is higher in public taps (13.1%) than that of reserviors water samples (7.6%).

Table (12): Pattern of pollution in 60 underground water samples from rural areas.

Source	No. of tested samples	Typical (confirmed E. coli)		Atypical		Total	
		No.	%	No.	%	No.	%
Main source	5	0	0	0	0	0	0
Rural hand pump	30	8	26.6	6	20	14	46.6
Rural taps	25	4	16	3	12	7	28
Total	60	12	20	9	15	21	35

* Underground water samples found to be polluted by both typical and atypical coliform.

* Rural hand pumps samples found to be more polluted (46.6 %) than that of than that of rural taps (28%).

Table (13): Mean value of presumptive coliform count in chlorinated water samples from Benha city.

Source	No. of tested samples	Number of bacterial colonies /100 ml of water samples*			
		0	0-10	10-100	100-200
Main source	4	4	0	0	0
Reservoir	13	12	1	0	0
Final outlets (public taps)	23	20	3	0	0

* Number of bacterial colonies / 100 ml of water was calculated according to McCardy's tables *(Senior, 1996).*

Table (14): Mean values of presumptive coliform count in underground water samples from rural areas.

Source	No. of tested samples	Number of bacterial colonies /100 ml of water samples*			
		0	0-10	10-100	100-200
Main source	5	5	0	0	0
Rural hand pump	30	0	16	1	13
Final outlet (rural taps)	25	0	18	7	0

* Number of bacterial colonies/ 100 of water was calculated according to McCrady's table ***(Senior, 1996).***

Table (15): Results of examination of 100 water samples for pathogenic organisms.

Source of water	Pathogenic bacteria		
	Salmonella	*Shigella*	*Vibrios*
Chlorinated	-	-	-
Underground	1*	-	-

* *S.P.B.* (one strain)

Table (16): Cytotoxic effect of *E. coli* strains filtrate in vero monolayer after one day of inoculation.

Strain number	Dilution					
	Undiluted	1/4	1/16	1/64	1/256	1/1024
1	4	3	2	1	1	0
2	2	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	4	3	1	1	0	0
6	4	2	2	0	0	0
7	0	0	0	0	0	0
8	4	3	1	0	0	0
9	4	4	3	2	1	0
10	0	0	0	0	0	0
11	2	0	0	0	0	0
12	0	0	0	0	0	0

0 = no response.

1 = $\leq$ 25%.

2 = about 50%.

3 = about 75%.

4 = $\geq$ 90% of cells affected.

(Konowalchuk, et al., 1977).

Table (17): Cytotoxic effect of *E. coli* strains filtrates in vero monolayer after two days of inoculation.

Strain number	Dilution					
	Undiluted	¼	1/16	1/64	1/256	1/1024
1	4	3	3	2	1	0
2	2	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	4	3	2	2	1	0
6	4	3	2	1	0	0
7	0	0	0	0	0	0
8	4	3	2	0	0	0
9	4	4	3	2	1	0
10	0	0	0	0	0	0
11	2	0	0	0	0	0
12	0	0	0	0	0	0

0 = no response.

1 = ≤ 25%.

2 = about 50%.

3 = about 75%.

4 = ≥ 90% of cells affected.

(Konowalchuk et al., 1977)

Table (18): Cytotoxic effect of *E. coli* strains filtrate in vero monolayer after three day of inoculation.

Strain number	Dilution					
	Undiluted	1/4	1/16	1/64	1/256	1/1024
1	4	4	3	2	1	0
2	3	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	4	4	2	2	1	0
6	4	4	2	1	0	0
7	0	0	0	0	0	0
8	4	4	2	0	0	0
9	4	4	4	3	2	0
10	0	0	0	0	0	0
11	3	0	0	0	0	0
12	0	0	0	0	0	0

0 = no response.

1 = $\leq$ 25%.

2 = about 50%.

3 = about 75%.

4 = $\geq$ 90% of cells affected.

(Konowalchuk et al., 1977)