DISCUSSION

There are about 400 various types of hotels and restaurants in Akola. Out of these randomly 269 hotels and restaurants were selected for analysis of drinking water available in the hotels and restaurants. Out of these 269 hotels and restaurants, good class 03 (1.1%), reasonably good quality 28 (10.4%), medium quality 33 (12.3%), road site hotels 91 (33.8%), road site tapir / dhaba 41 (15.2%), govt. office / canteen 05 (1.9%), bhojanalay / khanawal 17 (6.3%), pavbhaji / bhelwala 07 (2.6%), sweet marts / garden restaurants 37 (13.8%), cold drink / lassi wala 07 (2.6%). Fig.1

While analyzing the background of hotels and restaurants owner beginning from the age of owner it was found that 15 - 20 years 04 (1.5%), 16 - 25 years 11 (4.1%), 26 - 30 years 43 (16.0%), 31 - 35 years 77 (28.6%), 36 - 40 years 81 (30.1%), 41 - 45 years 40 (14.9%), 46 - 50 years 12 (4.5%), 51 - 60 years 01 (0.4%). Fig.2

The Education of hotels and restaurants owner are primary 01 (0.4%), middle 05 (1.9%), high school 46 (17.1%), HSSC (12th pass) 62 (23.0%), under graduate 38 (14.1%), graduate 97 (36.1%), post graduate 07 (2.6%), other/ diploma 09 (3.3%), medical / engg. 04 (1.5%). Fig.3
The religion and caste of hotels and restaurants owner are as Brahmin 23 (8.6%), Muslim 11 (4.1%), Buddha 03 (1.1%), Marwadi 61 (22.7%), OBC 72 (26.8%), Sindhi 32 (11.9%), Jain 15 (5.6%), Christian/Punjabi 07 (2.6%), SC 19 (7.1%), Other 26 (9.7%). Fig.4

These hotels and restaurants collect the drinking water from the various source such as Dug well water 02 (0.7%), bore well water with hand pump 09 (3.3%), bore well water with electric pump 108 (40.1%), corporation water supply 61 (22.6%), bore well water + corporation water supply 89 (33.1%). Fig.5

The Methods of Storage of water in these hotels and restaurants were as water cooler 08 (3.0%), cement tank (GL with tap) 32 (11.9%), cement tank (GL without tap) 30 (11.2%), OHT (cement / PVC / sintex) 60 (22.3%), rajan with tap 07 (2.6%), rajan without tap 24 (8.9%), drum with tap 27 (10.0%), drum without tap 25 (9.3%), OHT/ water cooler + filter 39 (14.5%). Fig.6

The Methods of drawing or supplying the water to customer by various methods such as by tap 37 (13.8%), by jug /mug long handle 100 (37.2%), vessel with long steel rod 35 (13.0%), direct (dipping hands) 05 (1.9%), tap and jug 54 (20.1%), direct and jug 27 (10.0%), water cooler and jug 03 (1.1%), jug + mug with short steel rod vessel 08 (3.0%). Fig.7
The Methods of Serving of water by hotels and restaurants workers to customers by various ways such as in tray 30 (11.2%), in cage 47 (17.5%), directly by hand 54 (20.1%), serving 4/5 glasses simultaneously by dipping fingers by single hand 36 (13.4%), self service 51 (19.0%), glass on table along with Jug 51 (19.0%). Fig.8

While analyzing the frequency of washing of storage tank or container it was found that the Daily 56 (20.8%), Twice in week 22 (8.2%), Thrice in week 08 (3.0%), Once in week 82 (30.5%), Once in fourth night 26 (9.7%), Monthly 68 (25.3%), Once in two month 07 (2.6%). Fig.9

Various workers are working in hotels and restaurants and the average age was found to be in the range of 05 - 10 years 01 (0.4%), 11 - 15 years 06 (2.2%), 16 - 18 years 45 (16.7%), 19 - 20 years 20 (7.4%), 21 - 25 years, 107 (39.8%), 26 - 30 years 71 (26.4%), 31 - 35 years 17 (6.3%), 36 - 40 years 02 (0.7%). Fig.11

These hotels and restaurants open at various timing, some hotels and restaurants open for whole day 154 (57.2%), Only in morning 06 (2.2%), Only in evening 44 (16.4%), morning and evening 62 (23.0%), seasonal 03 (1.1%). Fig.12
The worker working in hotels and restaurants have various standards of education from Illiterate 33 (12.3%), primary 18 (6.7%), middle school 42 (15.6%), high school 121 (45.0%), HSSC (12th pass) 44 (16.4%), under graduate 09 (3.3%), graduate 01 (0.4%), other/diploma 01 (0.4%). Fig.13

While analyzing the water quality in the hotels and restaurants in pre monsoon period showed potability in 31 (11.5%) and nonpotability in 238 (88.5%). The same hotels and restaurants showed the potability in post monsoon as potable 25 (9.3%) and nonpotable 244 (90.7%). Fig.16 and 17

The non potable water is examined for the presence of contaminant showed contamination under in pre monsoon as absence of coliform 31 (11.5%), Citrobacter freundii 25 (9.3%), Salmonella typhimurium 104 (38.7%), Escherichia coli 80 (38.7%), Salmonella typhimurium + Escherichia coli 07 (2.6%), Proteus vulgaris + Escherichia coli 09 (3.3%), Escherichia coli + Citrobacter freundii 09 (3.3%), Citrobacter freundii + Proteus vulgaris 04 (1.5%). Table 21.

The same hotels and restaurants showed the contamination of coliform and other coliform when water was tested for presence of coliform after monsoon showed as under absence of coliform 25 (9.3%), Citrobacter freundii 31 (11.5%), Salmonella typhimurium 76 (28.3%),
Escherichia coli 85 (31.6%), Salmonella typhimurium + Escherichia coli 09 (3.3%), Proteus vulgaris + Escherichia coli 10 (3.7%), Escherichia coli + Citrobacter freundii 20 (7.4%), Citrobacter freundii + Proteus vulgaris 13 (4.9%). Table 22.

Out of these 269 hotels and restaurants the owners are of different religion. Out of these 269 hotels and restaurants belong to Muslim owner showed 100% contamination, Sindhi 96.9%, Marwadi 91.8%, SC 89.5%, OBC 88.9%, Jain 88%, Other 84.6%, Brahmin 78.3%, Buddha 66.7% and least in Christian 57.1%. Table 30

These hotels and restaurants get their drinking water supply from various source and range of contamination found to be dug well 02 (100%), bore well with hand pump 09 (100%), bore well with electric pump 93 (86.1%), corporation water supply 54 (88.5%), bore well water and corporation water supply 81 (91.0%).

Out of these 269 hotels and restaurants, Pre monsoon storage procedure showed the rate of contamination as under as water cooler (87.5%), cement tank (GL with tap) (87.5%), cement tank (GL without tap) (86.5%), OHT (cement / PVC / sintex) (86.5%), rajan with tap (100%), rajan without tap (90%), drum with tap (100.0%), drum without tap (100%), OHT / water cooler + filter (76.9%). Table 23
In the post monsoon period the same hotels and restaurants showed Rajan and Drum showing 100% contamination and least in OHT/water cooler and filter are 76.9% and other storage as water cooler 87.5%, cement tank (GL with tap) 87.5%, OHT 86.7%. Table 24

The maximum coliform contamination was found in Rajan and Drum showing 100% and least coliform contamination found in OHT/water cooler and filter are 76.9%.

This clearly indicated that in the previous case the hand and the finger of hotels and restaurants owners or worker make the direct contact with the water and water got contaminated, but in the second case when least contamination because there is no direct contact of finger or hand of hotels and restaurants owners or worker, which prevent the secondary contamination this again proved the hypothesis that water get contaminated due to improper procedure of water serving in the hotels and restaurants.

The various method of withdrawing of water from the storage was employed by hotels and restaurants owners and workers the rate of contamination was in various degree and which is as under by tap (67.6%), by jug /mug long handle (90%), vessel with long steel rod (94.3%), direct (dipping hands) (100%), tap and jug (88.9%), direct and jug (95.3%), water cooler and jug
(100%), jug + mug with short handle (100%). Table 25 and 26

The highest coliform contamination was showed in the procedure of withdrawing the water by jug/ mug with short handle (100%) and least coliform contamination was showed in by tap (67.6%) 

The jug / mug with short handle or without handle contaminated the water by the dirty fingers and hands of hotels and restaurants owners and workers. The least coliform contamination was found in procedure in the collection of water by tap. This clearly indicated that in their collection procedure there is no direct contact with store water, water get less contamination this avoid secondary contamination and remain potable. This indicated that water became nonpotable due to incorrect procedures of storage.

While studying the methods of serving of drinking water in the hotels and restaurants it was found that drinking water served directly in glass (glass dipped in water) showed highest degree of contamination (100%), and least contamination was recorded in keeping the empty glass on the table and jug of water with handle (68.6%). This clearly indicated that in the previous case the hand and the fingers of hotels and restaurants owners or workers make the direct contact with the water and water got contaminated, but in the second case has least
contamination because there is no direct contact of fingers or hands of hotels and restaurants owners or workers, which prevent the secondary contamination. This again proved the hypothesis that water gets contaminated due to improper procedure of water serving in the hotels and restaurants.

The maximum coliform contamination was found in the Govt. office/canteen, pav bhaji and cold drink/lassiwala hotels and restaurants (100%) and least coliform contamination was recorded in the good class and reasonably good quality hotels and restaurants 33.3% and 67.9% respectively.

This indicated that the good class and the reasonably good quality hotels and restaurants maintain their hygienic condition properly and the hotels and restaurants which serve the food item on the road site did not maintain the hygienic condition properly which make the potable water become non potable. Table 37.

While study the contamination in reference to the health education of hotels and restaurants owners it was found that owners having no knowledge of health education showed the maximum contamination (89%) and least contamination showed in hotels and restaurants having some knowledge of health education (11%).
This indicated that knowledge of health education improve the quality of storage and handling of drinking water which prevent the contamination and diseases in the society.

While study the contamination in reference to the frequency of washing of storage tank, it was found that the frequency of washing of tank daily showed least contamination and maximum contamination showed in the monthly washing the tank. Table 36.

This indicated that the washing of tank regularly and properly improves the quality of drinking water and prevent chance of secondary contamination and water borne diseases in the society.

While studying the contamination in reference to the opening of the hotels and restaurants it was found that the whole day opening hotels and restaurants showed the maximum contamination and least contamination in the morning time opening hotels and restaurants.

This clearly indicated that the hotels and restaurants opened for whole day do not have the sufficient time to clean the hotels and restaurants, storage tank, cloth, utensils etc. So it will contaminate the water. While those hotels opened in the morning or evening have the sufficient time to clean the storage tank, washing the cloths, utensils keeping hygienic condition properly etc. which served better quality of water as compare to the
hotels and restaurants open in whole day right from the 7 am to 12 pm.

While studying the contamination in reference to uniform it was found that the workers having the dirty uniform showed the highest contamination and least contamination observed in the clean uniform.

This proved the hypothesis that the dirty uniform is also responsible for the contamination of drinking water as compare to the clean uniform. Table 20.