BIOBURDAN ON DRINKING WATER

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Abstract:-

The drinking water is important for life . If water is not safe it causes serious infections to human beings. In this work the water from the different sources from the Amravati city and near by area were collected and studied. The microorganism were isolated and there antibiotic sensitivity observed .Out of total 117 samples 63(53.84%) were positive or considered as non potable for drinking purpose. Out of total 63 samples 49 *E. coli* (77.77%), 37 *Klebsiella* (58.73%), 21 *Salmonella* (33.33%), 19 *Streptococcus* (30.15%) and 14 Staphylococcus (22.2%) were isolated. The highest no of species of *E. coli* and *Klebsiella* were isolated , the susceptibility of these two microorganisms performed which shows highest resistant in *E. coli* for the first and second line of antibiotics . The safest and susceptible antibiotic was found to be Imipeneum for *E.coli and Klebsiella* .

Key Words:- Water sample, MPN, Antibiogram.

Introduction:-

Water is abundant in nature occupying 71% of the earth surface (Gleick, 2006), only 1 % is accessible for human consumption (Lefort, 2006). The drinking water comes with various sources these include rainwater, surface water (streams, rivers, springs, lakes etc,) and underground water (shallow wells and deep wells and springs). Surface water is easily polluted, either by direct contamination by man and animals, or indirectly when rain washes faeces and other pollutants from the banks into the water body. Shallow wells are liable to pollution by seepage from surface water. Even the accessible drinking water would require series of treatments before it could be safe or fit for drinking. One of World Health Organization primary goals is access to adequate supply of safe drinking water for all. This goal is far from achievement in most developing countries especially in the rural and peri-urban areas as over 5 million people die annually of water-borne diseases such as cholera, typhoid, diarrhea. (Lefort, 2006, WHO, 2008). As per the report of the scientists of All India Institute of Medical Sciences (AIIMS), New Delhi, finds an alarming prevalence of various diseases causing microbes in drinking water and recreational water. The use of this water may lead to several life threatening diseases. Different authors also reported that Indian River system is polluted mainly because of the human impact (Goel and Bhosale, 2001; Patil *et al*., 2003; Maity *et al*., 2004). In India, more lives are lost of unsafe drinking water than the wars and terrorism combined. About 85% rural population in India is depended on ground water, which is depleting at a fast rate. Large scale industrial growth has caused serious concern regarding the susceptibility of ground water contamination due to waste material (Mishra *et al*., 2019) .

Material and Method:-

Sample collection

From different location that is tap water, borehole water, well water and river/lake water aseptically samples were collected into separate sterile containers. All the water samples were processed immediately for analysis within one hour of collection.

Multiple tube technique was used for the enumeration of Most Probable Number of coliform and non coliforms bacteria. Nutrient agar (NA) as a basal medium MacConkey agar as a differential medium and Blood agar as a special

medium were used to determine enteric bacteria. Enteric bacteria (coliforms and non coliforms) isolated on respective selective or differential media were identified on the basis of their Colonial, Morphological and Biochemical properties by Bergey's Manual of Determinative Bacteriology, 1994.

Biochemical and Sugars fermentation for identification

The isolates were identified by Catalase, Oxidase, Urease, IMViC, TSI and Carbohydrate fermentation tests.

Antimicrobial sensitivity test:-

The sensitivity pattern was studied by single disk diffusion method suggested by Kirby –Bauer method (1966). In this method single bacterial colony was inoculated in 3ml of sterile nutrient broth at 37°c for 4-6 hrs, then a sterile cotton swab was then dipped into nutrient broth tube and from the swab the Mueller –Hinton agar plate was spread. With the help of sterile forceps the antibiotics like Ampicilin (AMP 10mcg),Gentamycin(GEN 10 mcg) , Cephalexine (CN 30 mcg), Cefprodoxime (CPD 10 mcg), Ceftriaxone (CTR 30mcg), Ceftazidime (CAZ 30 mcg), Cefepime (CPM 30 mcg),Cefpirome (CFP 30mcg), Chloramphenicol (C30mcg) Imipenem(IMP 10 mcg) was used which was obtained from Hi-Media Laboratory ,India. Agrawal (2017) .

Result and Discussion:-

The total 117 clinical samples were studied out of them 63 samples (53.84%) were found positive from the different sources were they isolated. From that it was resulted that the river water having high percentage of contamination than the other water sources. Out of these 63 samples for *E.coli* 49 (77.77%) *Klebsiella* 37(58.73%) *Salmonella* 21(33.33%) *Streptococcus* 19(30.15%) *Staphylococcus* 14(22.2%) were found. Out of total 49 *E.coli* samples 30 samples and out of total 37 *Klebsiella* isolates 21 samples were resistant for two or more antibiotics were tested.

out of total isolated *E.coli* resistant pattern was AMP samples 28 (93.33%), GEN 27 samples(90%), CN 21 samples (70%), CPD 22 samples(73.33%), CTR 24 samples (80%), CAZ 20 samples(66.66%), CPM 23 samples(76.66%), CFP 17 samples (56.66%), Chloramphenicol 2 (6.67%). none of the samples was found resistant Imipenem.

After the invention of penicillin followed by Ampicillin (AMP)[10] was the choice of drug in preventing the infection caused by enterobacteriace family. But the developing resistance in microorganism is the greatest problem now a days. In the Present study 93.33% resistance was recorded which was higher than the findings of Manikandan and Amsath (2013) who reported 83.3% resistance rate. The resistance rate is correlates with Moini *et al.,* (2015) reported 96.3%, Tawfick *et al.,*(2016) reported 95.7% and Agrawal *et al.,(2018)* reported 95% resistance rate. Lower than the resistance rate was recorded by Kamble *et al.*, (2015) 100%

The 73.33% resistance rate for Cefpodoxime CPD[10] calculated by which was lesser than the findings of Zahedani *et al.,* (2016) they found 100% resistant rate. It correlates with the Agrawal *et al*.,(2018) reported 74% resistance rate.

In our investigation for Ceftazidime CAZ[30] 66.66% resistance rate was calculated which was lower than 77.42% and 76.5% resistance reported by Kamble *et al.,* (2015) and Zahedani *et al.,* (2016) respectively. While the lower resistance rate in no of investigations like in 55.9% by Kumar (2013), 50% by Moini *et al.,* (2015) followed by 45.8% in Manikandan and Amsath (2013) study while 43.9%in Tawfick *et al.,* (2016) also reported.

Similarly for Cephalexin CN[30] 70% resistance rate was calculated in our studies which was correlates with the findings of 69.9% rate reported by Manikandan and Amsath (2013).

For Ceftriaxone CTR[30] 33.3% resistance rate recorded by Manikandan and Amsath (2013) followed by 41.1% by Khamesipour F and Tajbakhsh E., (2016) similarly 51.9% by Moini *et al.,* (2015), 52.8% by Kumar (2013) as well as 59% by Toroglu and Keskin ., (2011) and 62.9% Yadegarynia *et al.,* (2017) , which was lower with respect

to that of our investigation which was 80%. It exactly correlates with the findings of Agrawal *et al.*,(2018) But the higher resistance by while 98% resistance rate by Zahedani *et al.*, (2016).

Resistance rate for Cefepime CPM^{30} 76.66% was noted in our findings which was higher than other studies , 34.4% by Khamesipour and Tajbakhsh ., (2016) , 22.03% by Kamble., *et al.*, (2015), while 40% by Shilpa *et al.*, (2016) and 37.3% by Zahedani *et al.*, (2016) as well as 37.1% by Yadegarynia *et al.*, (2017) and 46.7% by Kumar., (2013) respectively. Cefpirome CFP^{30} 56.66% resistance rate was observed in the present work.

Similarly for Imipenem IPM^{10} 100% sensitive that is 00% resistance rate was detected in our study which was exactly correlates with Moini *et al.*, (2015). The higher resistance rate reported in no of investigations like 13.9% by Manikandan and Amsath (2013), 4.4% by Khamesipour and Tajbakhsh (2016), 29.03% by Kamble *et al.*, (2015) while 43.33% by Shilpa *et al.*, (2016), 5.9% by Zahedani *et al.*, (2016) followed by 38.7% by Yadegarynia *et al.*, (2017).

The resistant pattern of *Klebsiella* was AMP samples 17 (80.95%), GEN 14 samples(66.66%), CN 11 samples (52.38%), CPD 13 samples (61.90%), CTR 12 samples (57.15%), CAZ 13 samples (61.90%), CPM 18 samples(85.71%), CFP 17 samples (80.95%), Chloramphenicol 1 (4.76%), none of the samples were found resistant to Imipenem.

In the present study the resistance to Gentamicin was 66.66% which was higher than the resistance described by Yadegarynia1(2017), they found it 59.7%, Manikchand (2013), they found it 19.4%. While the resistant was higher in our finding for Ceftriaxone 80% and Cefpirome 56.66% as compared to the findings 62.9% and 37.1% respectively. (Yadegarynia 2017)

The Ampicilin resistance was 93.33% and Ceftriaxone resistance rate was to be 80% which was higher for Ampicilin 83.3% and lower for Ceftriaxone which was 33.3% to the findings of Manikchand (2013).

In the present study resistance to Ceftazidime was 52.38% and Cefprodoxime was 61.90% which was lower to Ceftazidime 76.5% and exactly same to Cefprodoxime findings of Zahedani(2016).

The resistant rare for Cholermphinicol in previous study 41.5% by Kumar (2013) and by Kamble (2015) the resistant rate was found 45.45% which was much higher than that of present study which resulted 4.76% resistance rate.

Table1 :- positive sample source.

Sr.no	Tap water	borewellwater	Well water	River/lake water
1	17	09	13	24

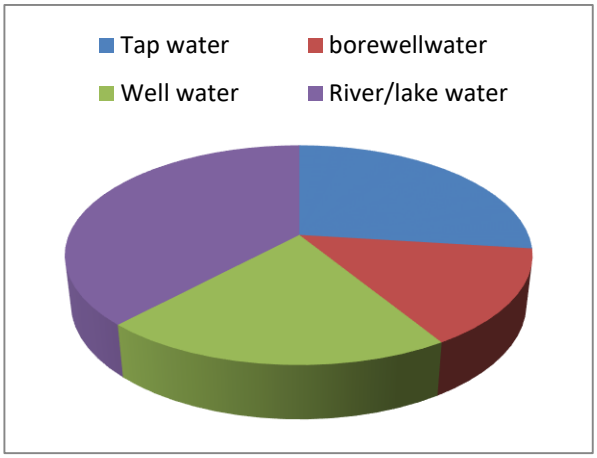

Fig 1:- Distribution of sample sources

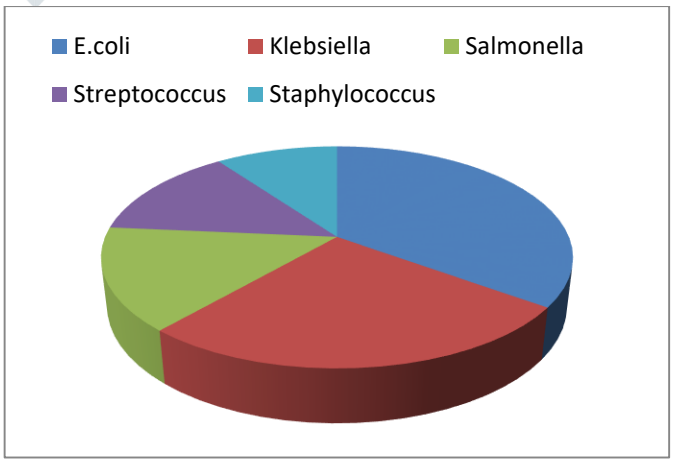

Fig 2:- Distribution of isolates.

table 2:- isolates from diff. samples.

Sr. no	E.coli	Klebsiella	Salmonella	Streptococcus	Staphylococcus
1	49	37	21	19	14

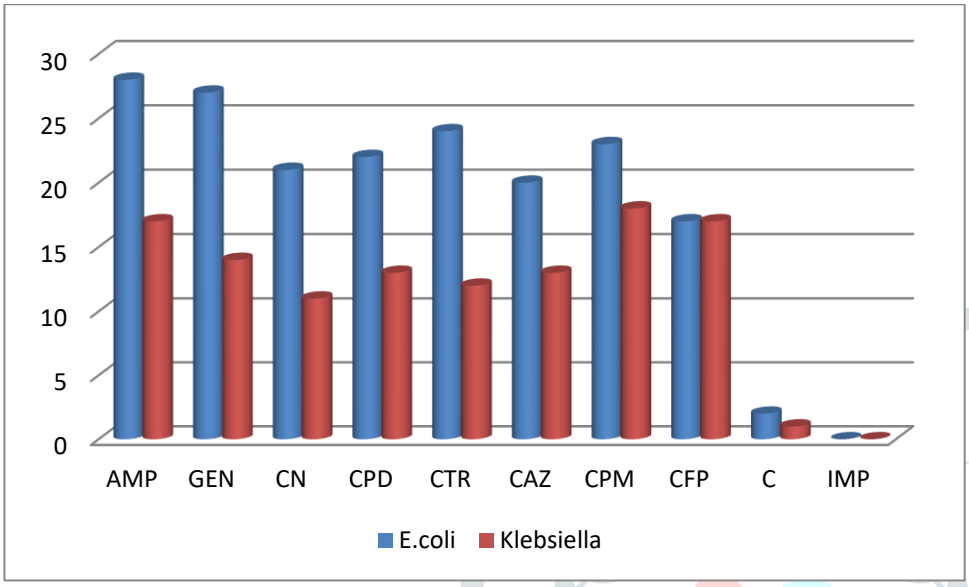

Fig 3:- Antibiotic susceptibility

Conclusion :-

The results of microbiological analysis of water samples showed that all the water samples were analyzed was not potable and fit for human consumption without any fear of contacting for any water-borne or water-related diseases. This indicate the increase in pollution in drinking water, unhygienic and improper sanitation. The present study indicates that polluted condition of the water resource have serious effects, because of presence of fecal and non fecal matters in water. From this study exempting Imipenem none of the isolates were clearly susceptible to antibiotic selected for the infection, which is the emerging challenge for everyone. The *E.coli* and *Klebsiella* were resistant to Ampicillin, Chloramphenicol, this could be due to exhaustive use of the first group of antimicrobials, while the other group is newly introduced in the medical field, but resistant also developed for them also. Worldwide the resistance of *E.coli* and *Klebsiella* increases dramatically but the new alternative medical line of treatment still not developed . The present data, may be useful in future for molecular resistance gene isolation in different areas and by using systemic and proper guideline to cure the problem. It is the need of the day to improve our immunity to combat with these powerful pathogens.

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