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Impact of Polluted Canal Water on Human Health in Sri Ganganagar District

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ABSTRACT: Residents in Faridkot, from where the Sirhind Feeder passes, reported a stench, and the district administration thus halted water supply to the town from the canal until the situation normalises. After Beas river saw a spill of molasses from a sugar mill in Gurdaspur that apparently killed hundreds of fish, the Rajasthan Feeder and Sirhind Feeder canals taking water from it saw their water turning black, too, on Saturday. Water in these canals comes from the Harike reservoir which too has seen the blackness from molasses that allegedly reduced oxygen in the water. Residents in Faridkot, from where the Sirhind Feeder passes, reported a stench, and the district administration thus halted water supply to the town from the canal until the situation normalises. Additional water has been released to dilute the effect of the molasses. Faridkot, Muktsar and Fazilka districts get water for irrigation and other purposes from Sirhind Feeder, while Rajasthan Feeder serves Hanumangarh, Suratgarh and Bikaner, even up to Jaisalmer, in that state. Further, Gang Canal is formed from the Sirhind Feeder which serves Sri Ganganagar district of Rajasthan. Raising concerns, oncologist Manjit Singh Jaura said, "Most cases of cancer are related to pollution. Drainage of industrial waste into rivers has long-term effects on humans."

Punjab Pollution Control Board chairman Kahan Singh Pannu said, "We have been tackling the situation. Water for drinking will not be affected as it gets filtered through the reverse osmosis (RO) systems." Principal secretary, irrigation, Jaspal Singh said, "We are expecting normalcy to return very soon as we have released more than 1000 cusecs of more water."
Meanwhile, the Rajasthan water department officials said contaminated water flows in the canals "regularly". The state's principal secretary, water resources, Shikhar Aggarwal, said, "We have raised the issue of contaminated water in canals at every platform for several years, but nothing has changed. We have sent our teams to Punjab during the monsoon season in the past for samples, which underline the contamination."
Sri Ganganagar district collector Gyana Ram said, "We have directed officials to take samples from Gang Canal."

KEYWORDS: Gang Canal, Polluted Water, Human Health, Sri Ganganagar, Rajasthan, Contamination, Human Health

I.INTRODUCTION

Seated on his small bed in a relatively dark room devoid of sunlight, Rafique Mohammed of Mirjewala village in Ganganagar says he has been recently cured of throat cancer. But, he rues the fact that the polluted water released from Ganga canal, fed from the Sutlej River near Firozpur in Punjab, has turned hazardous for the entire village.[1,2]
"I have got my three chemotherapies done in Bikaner for throat cancer. The treatment is almost over. The cancer was detected in the first stage. Now, I am feeling better. My father also suffered from cancer," said Rafique, who is in his mid-70s.
"Many villagers have been inflicted with cancer in Mirzewala due the polluted water," he added, who runs a stationery shop in the village.[3,4]
About 16 kilometres away, the villagers of Sadhuwali village in Ganganagar, located close to Ganga canal, believe that due to contaminated water released from the fertiliser plants in Punjab, the average life expectancy of the villagers has gone down to 60 years. "We get very dirty and poisonous water from the canal. This is not suitable for drinking. We have to drink the contaminated water by boiling and filtering as it is full of chemicals and other substances. People suffer from joint pains, digestion problems and dental issues. Earlier, the villagers didn't suffer from so many diseases. Now, every second person is sick. The water is totally black. Carcasses of animals and feathers of birds are often found in the canal," said a farmer Harvinder Singh.[5,6]

"The average life expectancy of people has also decreased over the years. Nowadays, 60 years is the average life expectancy. You won't find old people in the village. Just imagine what will happen to the kids? Their immune system won't work like ours. Our generation is surviving up to 60 because in our early age, we ate healthy food," he added.[7,8]
Mahajan Singh, a gram panchayat member of Ward No. 6 in Sadhuwali village, said, "We have complained to the collector

and the state government several times about the water, but nothing really happens. Last year, body of a young boy, who committed suicide in Bazidpur, Punjab was found in Sadhuwali village. There are filters in place, but they are faulty. Alum, used to purify water, is also being sold in black." Collector Ganganagar N Shivprasad Madan, meanwhile, admitted that when the canal is reopened after a temporary shut down every year, the stagnant or the polluted water in Punjab flows to Rajasthan. "For at least 15 days, the water remains dirty. So, we don't store that water and let it flow. We treat the water for drinking after 10 to 15 days by storing it. This is true that we face problems of polluted water every year. We have also asked the authorities in Punjab to take appropriate action."

A couple of days before the closure of Gang canal for maintenance , the amount of polluted water in Gang canal has increased causing problem for people in Sri Ganganagar.[9,10]

The colour of the available water has not only turned black but also its oxygen level has decreased significantly. There have also been reports of fish being killed due to the contaminated water at many places in the Ganga Canal.The same water will be supplied for drinking purpose after chlorination during the closure of the canal, which has raised concern for locals who say that chlorination does not remove the chemical-rich harmful substances present in the contaminated water[11,12,13].On report of black water, officers of the water resources department reached Sadhuwali head and collected samples, report of which will come .They say that harmful substances remain present in the water which causes serious adverse effects on health.The poisonous water containing chemicals is being released in the canal by thousands of factories located in Punjab. The same water is used for drinking purpose.Senior cardiac specialist Dr Pawan Saini says that poisonous water containing waste from factories is not completely clean even by chlorination, which only kills bacteria.Boiling water also does not eliminate hazardous particles like lead and arsenic thus UV filter should be used. Rajasthan Chief Minister Ashok Gehlot said at Sriganganagar, 40 km from here, that he would seriously take up the canal water pollution issue with his Punjab counterpart Capt Amarinder Singh soon. Most of the deputations that met Gehlot after he landed at Sriganganagar last evening as well as complained that highly contaminated water was flowing through Punjab after the Indira Gandhi Canal, Ferozepur feeder, Bhakra Canal system and Gang (Bikaner) canal were closed on March 25 and only partial supply remained to fill some drinking water reservoirs and for reconstruction and repair work.Till Friday afternoon, about 500 memorandums were submitted to Gehlot highlighting different problems. He was escorted by Pradesh Congress president and Deputy Chief Minister Sachin Pilot.Gehlot was told that the National Green Tribunal had in November 2018 clubbed cases of river pollution in Punjab, one based on a 2014 petition from Shobha Doodi and Shabnam Godara, former chairperson and vice-chairperson, respectively, of the Zila Parishad in Hanumangarh, which claimed that polluted water from the Sutlej and Beas, entering the state through the Indira Gandhi Canal, was affecting eight districts in West Rajasthan.[14,15]

II.DISCUSSION

Earlier, a committee headed by the Central Pollution Control Board, of which the Punjab Pollution Control Board (PPCB) was a part, submitted a report saying it found that the industrial discharge was not being treated as treatment plants were not functioning.

Gehlot said a number of cancer patients in Punjab and West Rajasthan had increased manifolds in recent years for which medical specialists primarily blamed water pollution, besides unhygienic environment. "Its moral and legal duty of respective governments to prevent water contamination for which strong steps need to be taken against the erring industrial units," he asserted.[16,17]

The study area (Gang Canal) is located in the district Ganganagar in the desert north western part of the state of Rajasthan (Lat 29" - 08' to 30" - 12'longitude 73" - 05' to 73" - 58") The canal system is brought to this region from Punjab and at present irrigates extensive tracts of this otherwise desert region.The Ganga Canal brought from the river Satluj is the precursor of the present Indira Gandhi Canal. This Gang Canal was built by Maharaja Ganga Singh of theerst while princely State of Bikaner in the year 1927. The canal flows almost throughout the year carrying water to these inhabitants of the area for their domestic and agricultural use. The morphometric features of Gang Canal are given in the table.

Water samples were collected in pre-cleaned and sterilized polyethylenebottles of one liter capacity. The sampling was done between 9-11 am and watersample were collected from middle of the canal. The samples were taken byholding the bottle at the bottom to avoid any contamination. The samples werebrought to the laboratory and immediately tested for dissolved O, and B.O.D.Other selected parameters were measured within 6-12 hrs of collection of samples.The sampling was done two times from the same site each after one fortnightinterval.The pH, total hardness, total alkalinity,

chloride, dissolved oxygen, B.O.D. (biological oxygen demand), and free CO, of water samples was analyzed by following standards.[18,19]

Table 1: Various Physico-chemical parameters

S.No.	Month	Parameters								
		PH	DO	CO2	Hardness	Alkalinity	Cl-	BOD	Acidity	TDS
1	August	8.18	2.1	6	178	28	36.4	10.12	25	320
2	September-I	8.27	3.2	8	124	50	15.62	3.04	20	260
3	September-II	8.18	9.6	10	146	84	15.62	8.76	15	280
4	October-I	8.55	8.8	8	144	84	35.5	8	20	880
5	October-II	8.62	10.8	10	194	64	26.9	9.84	20	680
6	November	8.2	5.6	4	128	68	18.46	5.16	40	300
7	December-I	8.68	10.4	8	114	60	25.56	9.52	45	230
8	December-II	8.44	14	12	114	54	18.46	1.95	45	280
9	January	8.6	11.8	14	108	52	32.66	3.8	30	240

The water quality for various uses should be as per specification of water required for particular use. The chemical parameters above the permissible limit have adverse effect on human health. Hardness, measured as CaCO3, when present more than 600 mg/l may affect water supply system (Scaling), lead to excessive soap consumption, calcification of arteries. There is no conclusive proof but it may cause urinary concretions, diseases of kidney or bladder and stomach disorder. Iron in traces is essential for nutrition and high Iron concentration (> 1.0mg/l) in water, though not having major effect on human health, gives bitter sweet astringent taste, causes staining of laundry and porcelain.Nitrate at very high concentration may cause infant methaemoglobinaemia (blue babies), causes gastric cancer and affects adversely central nervous system and cardiovascular system.Fluoride less than 1.0 mg/l is desirable in drinking water as it prevents dental carries but with very high concentration may cause crippling skeletal fluorosis. Copper is essential and beneficial element in human metabolism. Deficiency results in nutritional anaemia in infants. Large amount gives astringent taste, causes liver damage, central nervous system irritation and depression. In water supply it enhances corrosion of aluminium in particular. The desirable limit of Lead in drinking water is 0.05 mg/l . It is toxic in both acute and chronic exposures. Burning in the mouth, severe inflammation of the gastro-intestinal tract with vomiting and diarrhoea, chronic toxicity nausea, severe abdominal pain, paralysis, mental confusion, visual disturbances, anaemia etc are some of its manifestations when present in higher concentrations[20,21]

III.RESULTS

Common symptoms of mercury poisoning include peripheral neuropathy (presenting as paresthesia or itching, burning or pain), skin discoloration. Other symptoms may include kidney dysfunction (e.g. Fanconi syndrome) or neuropsychiatric symptoms such as emotional lability, memory impairment, or insomnia. Long term exposure to Cyanide affects the thyroid and central nervous system adversely. In drinking water the maximum permissible limit for cyanide is 0.05 mg/l and there is no relaxation in this value as beyond this limit water becomes toxic. Arsenic is a recognized carcinogenic element. The gastrointestinal tract, nervous system, respiratory tract and skin can be severely affected. Chronic poisoning is manifested by general muscular weakness, loss of appetite and nausea, leading to inflammation of mucous membrane in the eye, nose and larynx, skin lesions may also occur. Neurological manifestations and even malignant tumours in vital organs may also be observed. Humans residing in seleneferious areas of Punjab show loss of hair, malformation of finger and toe nails and progressive deterioration in human health.[22,23] Animals consuming Se rich fodder exhibit typical symptoms of Selenium poisoning. The most consistent clinical manifestations are loosing body condition and loss of hair, necrosis of tail, reluctance to move, stiff gate, and overgrowth of hooves followed by cracks gradually leading to detachment from main hoof. Water containing low amounts of uranium is usually safe to drink. Because of it's nature, uranium is not likely to accumulate in fish or vegetables and uranium that is absorbed will be eliminated quickly through urine and faeces. Uranium concentrations are often higher in phosphate-rich soil, but this does not have to be a problem, because concentrations often do not exceed normal ranges for uncontaminated soil. It is possible that intake of a large amount of uranium might damage the kidneys. There is also a chance of getting cancer from any radioactive material like uranium.[24,25] Natural and depleted uranium are only weakly radioactive and are not likely to cause cancer from their radiation. The provisional guideline by WHO (2004) of Uranium for drinking water is 15 µg/l. The guideline value is designated as provisional

because of outstanding uncertainties regarding the toxicology and epidemiology of Uranium. The pesticides have deleterious effects on health. Several of the pesticides are carcinogenic and cause long term harmful effect on health, in case contaminated water is continuously used for long term for human consumption). The organo-chlorine pesticides are more persistent and most toxic, therefore some of these pesticides are banned or regulated. The organo-phosphorous compound have short life span in the environment and these break down rapidly and pose less danger to wild life and contamination to ground water in comparison to organo-chlorine pesticides. Pesticides in drinking waters of Punjab indicate genotoxic effects which are not yet manifesting but are in the pre-carcinogenic phase. Besides causing acute and chronic toxicity[23,24], pesticides are affecting the immune system in general and other sensitive systems leading to immuno suppression, immuno potentiation and hypersensitivity of the host against infectious and non infectious diseases as well as causing glomerulonephritis, rheumatoid arthritis, carcinogenicity, reduced fertility, increased cholesterol, high infant mortality, varied metabolic and genetic disorders and reduced lifespan in humans and livestock populations in India.There is abundant evidence that many pesticides produce their acute toxic action by inhibiting enzymes. The excessive use of chemical fertilizer like urea, DPK, NPK, etc and pesticides (insecticides and weedicides) in Punjab have resulted in the disorders of endocrine glands e.g., thyroid, parathyroid, pituitary, kidneys and adrenals (Kheti Virasat,NGO). The main cause of water borne diseases and enteric diseases like cholera, typhoid, para-typhoid, bacillary, dysentery, gastro-enterititis etc. are due to the contamination of source with intestinal pathogenic micro-organisms. The contamination of drinking water by human/animal excreta faecal matter constitutes the most common mechanism for transmission of these organisms to healthy human being not only directly but also indirectly[25]

IV.CONCLUSIONS

The malaise which canal from is not a unique phenomenon; almost every river in India suffers from such malady. While the Government has been taking steps to improve the matter for more than three decades but success has been quite limited. To make matters worse, the demand on rivers is rising on account of rise in population, use of highly water intensive crops and many other reasons. In the series of items demanding higher use of water, the latest is the need for additional water due to India opting for an Open Defecation Free (ODF) society. This latest demand, while on its own is quite substantial, but unless comprehensively managed it will also add to the contamination of the water table . Pollution of water bodies is not only a function of higher human load but also on account of technology dependence and lack of awareness amongst the masses about the ill effects of pollution,[20,21] but the most important factor is the indifference of the society about preservation and conservation of the water bodies. A case in point is that most of the village ponds have been reduced to the state of garbage dumps, and in cities ponds and streams have been vanishing fast due to commercial interests of those who are quite myopic in their attitude. Obviously, the solutions being attempted are not in the right direction. There is a need to look at the threat on river life more realistically, more comprehensively, and above all, with an eye on future. A scenario buildup for the future will help the decision makers to arrive at a realistic strategy to address the problem. A system of review and the will to do course corrections as and when needed will help the country to save itself for the disaster looming large.[24,25]

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