

Assessment of fluoride concentration in Palar River in Kanchipuram district, Tamil Nadu, India

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ABSTRACT

Back ground: River Palar is one of the most contaminated rivers of India due to various industries. **Aim:** To study the fluoride concentration in the Palar river. Four river water samples were collected during the pre-monsoon season spanning over June 2015. **Methodology:** Fluoride levels were analyzed by standardized analytical method by the Chief Water Analyst, State Level Water Testing Laboratory, Tamil Nadu Water Supply and Drainage Board, Government of Tamil Nadu, Chennai (ISO 9001–2000 - Certified). **Result:** In the present study, fluoride contents in all samples ranged between 0.18 and 0.22 mg/l, which are less than the optimum range of 1.5 mg/l, as recommended by the WHO.

KEY WORDS: Fluoride, Palar River, Water quality

INTRODUCTION

River water resources are highly essential for various domestic, agricultural, and industrial purposes. Hence, the consumption rate is increasing day by day in the areas where surface water sources are not enough to meet the demands. In recent decades, water pollution has been considered as an important agenda for various research activities due to its significant role in affecting human health as well as its risks.

In general, tanning industries show a tendency of consuming a large amount of water for various processing steps and these water bodies are discarded as waste with a complex of numerous synthetic chemicals. The minimum concentration of effluents produced by tanneries is 3000–3200 L/100 kg of hide processed.^[1] Release of ineffectively treated wastewater into the surface leads to the contamination of ground and surface water sources.

In India, tanneries are scattered unevenly, Tamil Nadu takes the lead in the total number of tanneries in India. About 60% of the national tanning factories and 6%

of the global tanning factories are located in this state. Out of this, 449 units are located in the Vellore district, particularly in the Palar basin (Upper Palar). The impact of tannery wastewater disposal leads to environmental as well as social disharmony of the society and also acts as a major industrial pollution source that the country faces today. Even though this problem persists for a long time, it has attracted serious attention only in recent time.

The Palar River basin has been polluted by a cluster of tanneries which are distributed along its banks. Understanding its pollution status, the Ministry of Environment and Forests, Government of India, has categorized the Palar River as one of the most critically polluted areas in the country. There are numerous studies in reports; however, most of the studies are concentrated on heavy metal distribution and groundwater pollution modeling.^[2-4] In this context, the present work attempts to identify the fluoride concentration in Palar River in Kanchipuram district, Tamil Nadu, India.

MATERIALS AND METHODS

Study Area

The Palar River drains in the northern part of Tamil Nadu. It is a seasonal river and flows only for

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Table 1: Fluoride concentration in Palar River

Description	Sample 1	Sample 2	Sample 3	Sample 4
Fluoride mg/l	0.18	0.22	0.19	0.21

a few days in a year. The Palar River originates in the highlands of Nandidrug in the Kolar district of Karnataka state, starts from southwestern direction to Vaniyambadi and then flows eastward till it joins the Bay of Bengal. The Palar River banks are mainly underlain by alluvium- and gneissic-type formations.

Collection of Water Sample

About 500 ml of water was collected in a clean dry polythene container during the pre-monsoon season spanning over June 2015 and labeled with information such as date of collection, source, and place. Fluoride levels were analyzed by standardized analytical method by the Chief Water Analyst, State Level Water Testing Laboratory, Tamil Nadu Water Supply and Drainage Board (TWAD), Government of Tamil Nadu, Chennai (ISO 9001–2000 - certified).

RESULTS

Table 1 shows fluoride concentration observed in four different sample sites of Palar River, ranging between 0.18 and 0.22 mg/l.

DISCUSSION

In the present study, fluoride contents in all samples ranged between 0.18 and 0.22 mg/l, which are less than the optimum range of 1.5 mg/L, as recommended by the WHO. In a study to assess the groundwater fluoride concentration in Kanchipuram by Kumar *et al.*, 2014, it was found that the fluoride concentration ranged between 0.05 and 1.04 mg/l.^[5] Similar study done by Kumar *et al.* in selected stations of Palar Riverbed in Vellore district showed that the fluoride concentration ranged between 0.4 and 0.8 parts per million (ppm).^[6] Kuppuraj 2010 identified that the mean fluoride during pre-monsoon period was 1.07 mg/l.^[7] In the present study, the fluoride contents in all the samples exhibit their suitability for drinking.

Similar studies done by Kumar *et al.* in Chennekothapalli Mandal, Anantapur district, Andhra Pradesh, the fluoride concentration was 1.46 and 1.68 mg/dl,^[8] in

Ennore, Chennai, it ranged from 1.83 to 2.01 ppm,^[9,10] and in Madurai, it was found to be 0.12–1.2 mg/L.^[11] In a study done in Porur, Chembarambakkam, and Puzhal Lake, Chennai, has fluoride content of 0.36, 0.28, and 0.22 mg/l, respectively.^[12]

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