DRINKING WATER QUALITY ASSESSMENT IN SELECTED AREAS OF RAWALPINDI BY ANALYSING PHYSICO-CHEMICAL AND BIOLOGICAL PARAMTERS

ABSTRACT

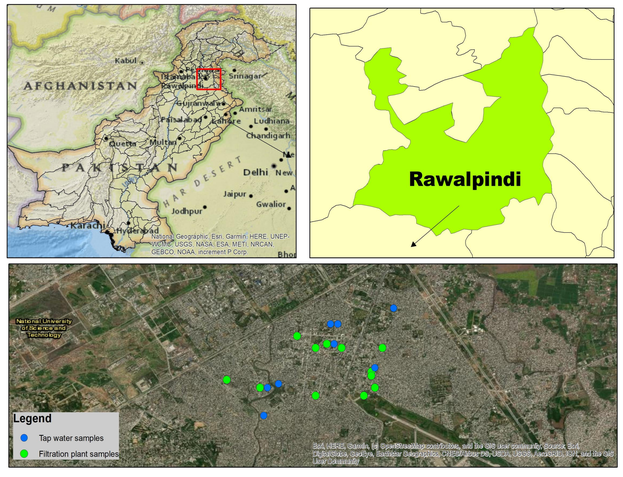
In this study, drinking water quality of different densely populated areas of Rawalpindi was analyzed. Since, Commercial Market, Satellite Town, Murree Road, Khayaban-e Sir Syed, Pirwadai are among the busiest areas of Rawalpindi and are densely populated. The main source of water in the area is water from filtration plants and bore tap waters. The filtration plants are installed by WASA under Punjab government and tap water. Since, demand of water is greater than its supply, many locals have installed bores in order to meet their increasing water demand. The main purpose of this study was to determine the quality of drinking water in selected areas of Rawalpindi and to determine whether it is related to gastrointestinal diseases or not. For this, water samples were collected from eleven water filtration plants, this included both government and private plants and nine bore tap waters were selected.

INTRODUCTION

Water, chemically a compound made by covalent bonding of two hydrogen atoms and one oxygen atom, but biologically it is what made life possible on this green planet. Water is the fundamental requirement for all life. The existence of every living organism itself revolves around water. Since water is the essence of life and all life on earth depends on it, for this very reason, this resource has been the cause of wars and disputes since the beginning of time. In past, it was priority of every civilization to settle near fresh water source. It can be seen in nature that wherever water is present, life seems to bloom around it, while places that don't have access to water are barren like the deserts. In today's, world although distance has become short due to advancement in technology, still disputes over water continue. Today the disputes exist, but now race is to get access to warm waters, in order to accelerate the import, export and economic purposes

STUDY AREA

Study area, selected for the study includes densely populated and main areas of Rawalpindi i.e. the capital of Rawalpindi Division, in Punjab, Pakistan. Sites from where water samples for analysis were collected are basically locations near Murree road including, Satellite Town, Pirwadhae, Khayaban e Sir Syed. These are some of the busiest areas of Rawalpindi, being the hub of wholesale shops, businesses etc. A lot of renowned educational institutions as well as residential societies are also located in the area. The main source of water in the study area is surface water and groundwater. Water to filter plants is supplied from Khanpur Dam and Rawal Lake under RDA. But due to increasing demand of water, many residents of the area have installed their own boring wells, and are using it to meet their demands (Mashiatullah, et al., 2010) Map of study area is shown in Figure below.



MATERIALS AND METHODS

In order to determine drinking water quality of selected areas of Rawalpindi quantitative research method was used. Quantitative research methods are those methods that rely on measuring variables using a numerical system, analysing these measurements using any of a variety of statistical models, and reporting relationships and associations among the studied variables. In this study waters samples from both filtration plants and tap (bore) water were analysed and then compared. The methodology adapted for the research work is shown in the flow chart below:

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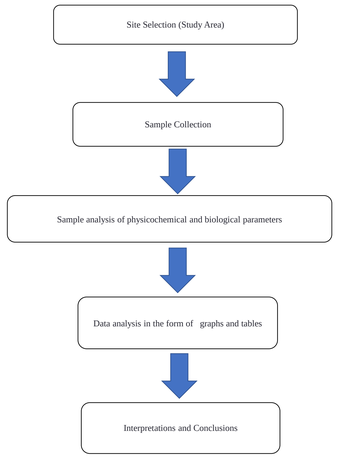


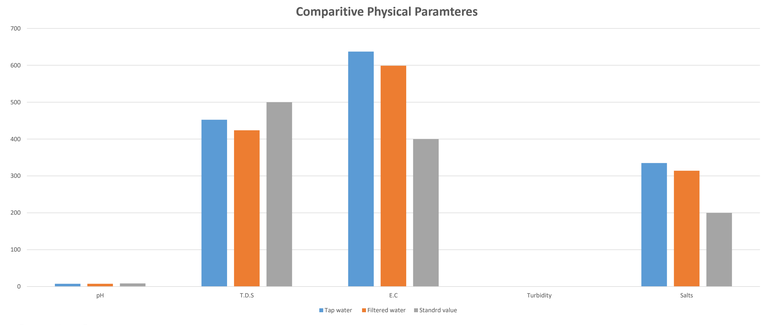
Figure 2.1: Flow chart showing research work methodology

RESULTS AND DISCUSSIONS

The water samples collected from different area of Rawalpindi were analyzed for physicochemical and microbiological parameters. The resultant values obtained after physicochemical and biological analysis were compared with permissible limits set by WHO, PSQCA and NDWQS.

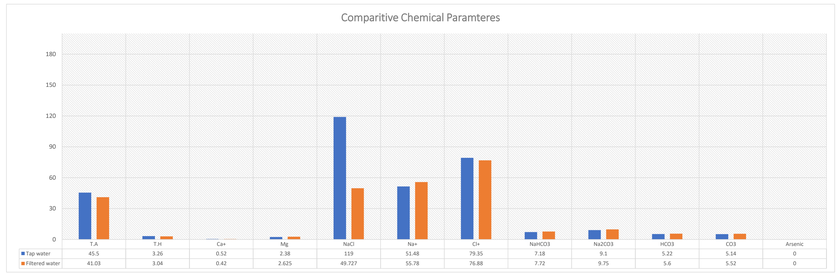
Physical Parameters

After conducting tests for various physical parameters of water in lab the results obtained were tabulated. The results of the physical parameters of the eleven samples of filtered water have been presented in the below graph.



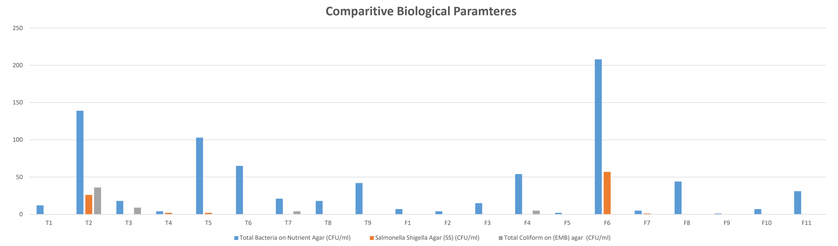
Chemical Parameters

In order to determine concentration of various elements like Ca, Mg, Na, carbonates etc. Chemical analysis was done in laboratory and obtained results were tabulated. The results of the chemical parameters of the eleven samples of filtered water have been presented in the below graph.



Biological Parameters.

After conducting tests for various Biological parameters of water in lab the results obtained were tabulated. The results of the biological parameters of the eleven samples of filtered water and nine ample of tab water have been presented in the below graph.



CONCLUSIONS

- In the present study, water samples were collected from various filtration plants as well as (bore) tap water from different areas of Rawalpindi to be utilized in obtaining water quality information. The physiochemical and biological analysis result of the filtered and tap water samples were compared with the WHO, PSQCA, and NSDWQ 2010 drinking water standards.
- Following conclusions are drawn from the study:
- All the physical parameters were not exceeding the permissible limits of given standards except for the fact that TDS and salts were found in high concentration.
- While in case of biological parameters most grave fact is that a lot of the samples exceeded the permissible limits for *total coliforms, salmonella* and *shigella* whose permissible limit is '0'. While total bacterial count was also high in many water samples.
- Also, it was noted that samples taken from tap waters (bore) had higher microbiological growth as compared to those taken from filter plants. It means that the tap water when compared to filter water is less suitable for drinking when compared for biological parameters.
- The overall result of the study showed that the concentration of all the physicochemical parameters were far below the permissible limits while concentration of biological parameters exceeded the permissible limits.

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