

DEVELOPMENT OF A WATER PURIFICATION METHOD FOR USE IN AREAS AFFECTED WITH THE CHRONIC KIDNEY DISEASE OF UNKNOWN ETIOLOGY (CKD_U)

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The quality of water available for human consumption is very important as it has a direct influence on the health conditions. However, obtaining good quality drinking water is an emerging concern in many parts of the country. A commonly found lethal illness among the farmers in the North Central province of Sri Lanka, Chronic Kidney Disease of unknown etiology (CKD_U) is believed to be related to many constituents in drinking water.

CKD_U cannot be identified and characterized in the early stages and also does not have a proven medical treatment other than a kidney transplantation surgery, which is not affordable for the vast majority of the victims. Therefore, a preventive measurement for the disease is extremely essential.

There are many theories proposed as the root cause for the disease. However, the exact cause for the disease is yet to be concluded. High fluoride content, high hardness, Cyanobacteria, arsenic and heavy metals are the main suspects. Some experts believe that it is a combined effect of few or all of above components. Therefore, as many studies suggested, reduction of these parameters in the drinking water will help to mitigate the disease.

There are some proven technologies (e.g. Reverse Osmosis - RO) available to reduce the above contaminants below the expected levels. However, practical implementation of RO is highly questionable as the costs are far beyond the reach of an average income person. However, there are cost effective methods available to remove each contaminant separately. If the most economic, yet effective technologies for the removal of each contaminant can be used collectively at an affordable price to the majority, it will be a huge benefit for the people who are in danger.

As per the findings of the literature review, the ideal water filtering process shall be able to reduce the hardness by ion exchange, reduce the fluoride and arsenic by modified activated alumina, ensure disinfection with nano silver, remove organic chemicals by activated carbon and remove suspended solids by silica sand.



The applicability of above treatment regime was tested and validated for the possibility of collective usage and needs to be followed by a by prolonged lifetime analysis.

The outcome of the study was promising as filtered water had shown the reduction of both the hardness of the feed water from 780 ppm as CaCO_3 to less than 40 ppm as CaCO_3 and fluoride content from 4.15 ppm to values between 0.8 ppm & 0.9 ppm. In addition, the water filtered using this method had shown effective reduction of initial arsenic level of 23 ppb to less than 5 ppb and initial phosphate level of 3.15 ppm to less than 0.5 ppm.

In addition, leaching of components (Iron, Silver and aluminum) associated with the filtration materials was not observed. Therefore, the developed methodology can be successfully applied for the filtration of water in the areas affected by the chronic kidney disease.