Data Article

Data on microbial and physiochemical characteristics of inlet and outlet water from household water treatment devices in Rasht, Iran

Dariush Naghipour\textsuperscript{a}, Seyed Davoud Ashrafi\textsuperscript{a,b}, Ali Mojtahedi\textsuperscript{c}, Masoud Vatandoost\textsuperscript{a}, Loghman Hosseinzadeh\textsuperscript{a}, Esmail Roohbakhsh\textsuperscript{a,d,*}

\textsuperscript{a} School of Health, Guilan University of Medical Sciences, Rasht, Iran
\textsuperscript{b} Research Center of Health and Environment, Guilan University of Medical Sciences, Rasht, Iran
\textsuperscript{c} Department of Microbiology, Faculty of Medicine, Guilan University of Medical Sciences, Rasht, Iran
\textsuperscript{d} Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran

\textbf{A R T I C L E  I N F O}

\textbf{Article history:}
Received 26 November 2017
Accepted 14 December 2017
Available online 20 December 2017

\textbf{Keywords:}
Household water treatment
Drinking water quality
Anions
Cations

\textbf{A B S T R A C T}

In this research, we measured various parameters related to drinking water quality include turbidity, temperature, pH, EC, TDS, Alkalinity, fecal and total coliform, heterotrophic plate count (HPC), free chlorine, Mn, Ca, Mg, Fe, Na, Cl\textsuperscript{-}, F\textsuperscript{-}, HCO\textsubscript{3}, in the inlet and outlet of household water treatment devices according to the standard methods for the examination of water and wastewater (W.E. Federation and Association and A.P.H., 2005) \cite{1}. Sixty four inlet and outlet water samples were taken from thirty two household water treatment devices from eight different residential blocks in Golsar town of Rasht, Iran. The data obtained from experiments were analyzed using the software Special Package for Social Sciences (SPSS 24) and MS-Excel.

© 2017 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

* Correspondence to: School of Health, Guilan University of Medical Sciences, Rasht, Iran.
E-mail address: esmaeil5115@yahoo.com (E. Roohbakhsh).

https://doi.org/10.1016/j.dib.2017.12.038
2352-3409/© 2017 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).
## Specifications table

| Subject area               | Environmental Engineering |
|----------------------------|---------------------------|
| More specific subject area | Drinking water quality    |
| Type of data               | Figure and table          |
| How data was acquired      | Total dissolved solid (TDS) were measured by scaling method using oven and digital scale. Anions and Cations were measured by using UV–vis spectrophotometer and flame photometer. Total and fecal coliform were determined by multiple-tube fermentation technique. Heterotrophic plate count (HPC) was done using membrane filtration method. Free chlorine was measured using DPD method. |
| Data format                | Raw, analyzed             |
| Experimental factors       | Samples were collected randomly from eight blocks in Golsar town of Rasht. The glasses bottles (250 ml and 2000 ml) were used to sample collection. The samples were taken transferred to the laboratory under acidic condition and 4 °C for analyzing of anions and cations. Although, for analyzing of microbial parameters the samples were transferred under 6 h and the temperature of 4 °C. |
| Experimental features      | Physicochemical and microbial parameters of drinking water include; K\(^+\), NO\(_3^-\), Mn\(^{2+}\), Mg\(^{2+}\), Ca\(^{2+}\), Na\(^+\), Cl\(^-\), Fe\(^{2+}\), Mg\(^{2+}\), F\(^-\), HCO\(_3^-\), TDS, EC, pH, turbidity, total hardness, alkalinity, free chlorine, temperature, total and fecal coliform and HPC. |
| Data source location       | Golsar town of Rasht, Guilan Province, Iran. |
| Data accessibility         | All data are available within this article. |

## Value of the data

- These data describe performance of household water treatment device and will be useful for who use this devices for water purification.
- The data will be valuable for the experts of healthcare center.
- The data will be useful for the engineers related to household water treatment device maintenance.

## 1. Data

The data in this paper express the quality of urban drinking water and household water in the inlet and outlet of household water treatment devices. So, the selected parameters of drinking water quality were some important microbial and physicochemical parameters such as; K\(^+\), NO\(_3^-\), Mn\(^{2+}\), Mg\(^{2+}\), Ca\(^{2+}\), Na\(^+\), Cl\(^-\), Fe\(^{2+}\), F\(^-\), HCO\(_3^-\), total and fecal coliform, turbidity, temperature, total hardness, TDS, EC, alkalinity, free chlorine and Heterotrophic plate count (HPC) [2–6]. The data from the experiments of inlet water for physicochemical parameters; turbidity, temperature, EC, pH, total hardness and total alkalinity were 0.73 NTU, 23.1 °C, 587 µs/cm, 7.62, 182.5 mg/L CaCO\(_3\) and 190.1 mg/L CaCO\(_3\), respectively (Table 1). Although, the value of these parameters in outlet were 0.26 NTU, 23.9 °C, 124 µs/cm, 6.95, 56.4 mg/L CaCO\(_3\) and 53.7 mg/L CaCO\(_3\), respectively (Table 1). Aimed at the microbial quality of inlet water the data from the experiments for parameters; fecal and total coliform, heterotrophic plate count (HPC) and free chlorine were 0 and 0.4 MPN/100 mL, 7 CFU/mL and 0.2 mg/L, respectively (Table 2). While, the value of these parameters in outlet water were 0.2 and
Table 1
The values of physicochemical parameters in inlet and outlet of household water treatment device.

| Parameter       | Unit          | Mean Inlet | Mean Outlet | Standard deviation Inlet | Standard deviation Outlet | Removal efficiency (%) | Standards |
|-----------------|---------------|------------|-------------|--------------------------|---------------------------|------------------------|-----------|
| Turbidity       | NTU           | 0.73       | 0.26        | 0.2                      | 0.08                      | 10.2                   | Iran 5    |
| Temperature     | °C            | 23.1       | 23.9        | 1.5                      | 1.5                       | –                      | –         |
| pH              | –             | 7.62       | 6.95        | 0.14                     | 0.28                      | –                      | –         |
| EC              | µS/cm         | 587        | 124         | 125                      | 82.7                      | 79                     | 6.5–8.5   |
| Total coliform  | MPN/100       | 0.4        | 0.9         | 0.56                     | 0.64                      | –                      | 0         |
| Fecal coliform  | MPN/100       | 0          | 0.2         | 0                        | 0.6                       | –                      | 0         |
| HPC             | CFU/mL        | 7          | 324         | 4.17                     | 134                       | –                      | <500      |
| Free chlorine   | mg/L          | 0.2        | 0           | 0.12                     | 0                         | –                      | 5         |
| Total hardness  | mg/l CaCo₃    | 182.5      | 56.4        | 11.3                     | 23.8                      | 69                     | 500       |
| Total alkalinity| mg/l CaCo₃    | 190.1      | 53.7        | 48.3                     | 36.8                      | 71.6                   | –         |

Table 2
The values of microbial parameters in inlet and outlet of household water treatment device.

| Parameter       | Unit          | Mean Inlet | Mean Outlet | Standard deviation Inlet | Standard deviation Outlet | Removal efficiency (%) | Standards |
|-----------------|---------------|------------|-------------|--------------------------|---------------------------|------------------------|-----------|
| Total coliform  | MPN/100       | 0.4        | 0.9         | 0.56                     | 0.64                      | –                      | 0         |
| Fecal coliform  | MPN/100       | 0          | 0.2         | 0                        | 0.6                       | –                      | 0         |
| HPC             | CFU/mL        | 7          | 324         | 4.17                     | 134                       | –                      | <500      |
| Free chlorine   | mg/L          | 0.2        | 0           | 0.12                     | 0                         | –                      | 5         |

Table 3
The values of cations and anions parameters in inlet and outlet of household water treatment device.

| Parameter       | Unit          | Mean Inlet | Mean Outlet | Standard deviation Inlet | Standard deviation Outlet | Removal efficiency (%) | Standards |
|-----------------|---------------|------------|-------------|--------------------------|---------------------------|------------------------|-----------|
| Manganese       | mg/L          | 0.07       | 0.0025      | 0.06                     | 0.007                     | 91.7                   | 0.05      |
| Calcium         | mg/L          | 47.9       | 14.1        | 7.1                      | 3.9                       | 70.6                   | 200       |
| Magnesium       | mg/L          | 14.1       | 6.9         | 3.9                      | 5.8                       | 65.2                   | 150       |
| Sodium          | mg/L          | 31.7       | 11.2        | 10                       | 9.1                       | 64.6                   | 200       |
| Potassium       | mg/L          | 0.51       | 0.1         | 0.56                     | 0.19                      | 80.3                   | 200       |
| Iron            | mg/L          | 0.13       | 0.05        | 0.02                     | 0.06                      | 65.4                   | 200       |
| Nitrate         | mg/L          | 1.1        | 0.69        | 1.14                     | 1.36                      | 37                     | 45(NO₃⁻) |
| Chloride        | mg/L          | 63.7       | 22.7        | 16.2                     | 7.7                       | 64.4                   | 400       |
| Fluoride        | mg/L          | 0.03       | 0.02        | 0.04                     | 0.03                      | 44.4                   | 1.5       |
| bicarbonate     | mg/L          | 230.8      | 65.5        | 57.7                     | 44.9                      | 71.6                   | –         |

Table 4
Paired statistical analysis for comparing inlet and outlet data.

| Parameter       | Unit          | t-test | Degrees of freedom | P-value |
|-----------------|---------------|--------|--------------------|---------|
| HPC             | CFU/mL        | –6.312 | 7                  | 0       |
| Turbidity       | mg/L          | 6.023  | 7                  | 0.001   |
| TDS             | mg/L          | 8.774  | 7                  | 0       |
| Total alkalinity| mg/L          | 7.676  | 7                  | 0       |
| Total Hardness  | mg/L          | 12.766 | 7                  | 0       |
| Calcium         | mg/L          | 10.780 | 7                  | 0       |
| Iron            | mg/L          | 5.534  | 7                  | 0       |
| Chloride        | mg/L          | 8.116  | 7                  | 0.001   |
| Sodium          | mg/L          | 9.988  | 7                  | 0       |
| EC              | mg/L          | 8.775  | 7                  | 0       |
Table 5
Paired statistical analysis results for comparing inlet and outlet data.

| Parameter       | Unit          | z-test | Mann–Whitney Test | P-value |
|-----------------|---------------|--------|-------------------|---------|
| Total coliform  | MPN/100 mL    | -1.541 | 18                | 0.123   |
| Fecal coliform  | MPN/100 mL    | -1     | 28                | 0.317   |
| Free chlorine   | Mg/L          | -2.919 | 8                 | 0.004   |
| Magnesium       | Mg/L          | -2.731 | 6                 | 0.006   |
| Manganese       | Mg/L          | -2.176 | 14                | 0.03    |
| Nitrate         | Mg/L          | -1.042 | 23                | 0.298   |
| Fluoride        | Mg/L          | -0.544 | 8                 | 0.586   |
| Potassium       | Mg/L          | -2.551 | 8                 | 0.011   |
| pH              | –             | -2.524 | 8                 | 0.012   |

Fig. 1. Map and sampling points of study area.
0.9 MPN/100 mL, 324 CFU/mL and 0 mg/L, respectively (Table 2). In addition, values of inlet cations and anions parameters; Mn$^{2+}$, Ca$^{2+}$, Mg$^{2+}$, Na$^+$, K$^+$, Fe$^{2+}$, NO$_3^-$, Cl$^-$, F$^-$ and HCO$_3^-$ were 0.07, 47.9, 14.1, 31.7, 0.51, 0.13, 11, 63.7, 0.03 and 230.8 mg/L, respectively (Table 3). Although, values of outlet were 0.0025, 14.1, 6.9, 11.2, 0.1, 0.05, 0.69, 22.7, 0.02 and 65.5 mg/L, respectively (Table 3). According to data, the microbial quality of outlet water of household water treatment device was decreased and could not provide WHO standards (Table 2). Statistical analysis of data for inlet and outlet water quality were presented in Tables 4 and 5.

2. Experimental design, materials and method

2.1. Study area description

According to map and sampling points on Fig. 1, the study site is localized to eight blocks in Golsar town of Rasht in Guilan Province, Iran. In each block four devices in four different homes has been selected. All household water treatment devices contains; cotton fibers, ion exchange cartridge, carbon active cartridge, and reverse osmosis.

2.2. Sample collection and analytical procedure

Sampling and experimental period were in April to June which collected and analyzed according to the standard method [1]. The data were analyzed using the software Special Package for Social Sciences (SPSS 24) and MS-Excel.

Acknowledgements

The authors gratefully acknowledge staff of Rural Water and Wastewater Company of Guilan Province.

Funding sources

This work was supported by Rural Water and Wastewater Company of Guilan Province and Guilan University of Medical Sciences.

References

[1] W. E. Federation and Association, A.P.H., Standard Methods for the Examination of Water and Wastewater, American Public Health Association (APHA), Washington, DC, USA, 2005.

[2] N. Yousefi, A. Fatehizedeh, K. Ghadiri, N. Mirzaei, S.D. Ashrafi, A.H. Mahvi, Application of nanofilter in removal of phosphate, fluoride and nitrite from groundwater, Desalin. Water Treat. 57 (25) (2016) 11782–11788.

[3] F. Soltani, A. Ghomeishi, M.J. Mohammadi, A. Karimyan, M. Khoshgoftar, F. Darabpour, A. Afkar, A.R. Yari, M. Mahboubi, B. Rastegarimehr, A. Yusefzadeh, S.Z. Salehi, M. Vosoughi, S. Geravandi, Association of toxic microbial and chemical water quality of hemodialysis instruments during 2016, Fresenius Environ. Bull. 26 (8) (2017) 5357–5362.

[4] S.D. Ashrafi, H. Kamani, A.H. Mahvi, The optimization study of direct red 81 and methylene blue adsorption on NaOH-modified rice husk, Desalin. Water Treat. 57 (2) (2016) 738–746.

[5] S.D. Ashrafi, H. Kamani, H. Soheil Areqomand, N. Yousefi, A.H. Mahvi, Optimization and modeling of process variables for adsorption of Basic Blue 41 on NaOH-modified rice husk using response surface methodology, Desalin. Water Treat. 57 (30) (2016) 14051–14059.

[6] S.D. Ashrafi, H. Kamani, J. Jaafari, A.H. Mahvi, Experimental design and response surface modeling for optimization of fluoroquinolone removal from aqueous solution by NaOH-modified rice husk, Desalin. Water Treat. 57 (2016) 16456–16465.