The aim of this study was to Monitoring of physical and chemical characteristics of ground water including Ca$^{2+}$, Mg$^{2+}$, EC, pH, TDS, TH, HCO$_3^-$, Na$^+$, K$^+$, Cl$^-$, SAR, %Na and SO$_4^{2-}$ in Zanjan city, Iran. For assessing the physico-chemical parameters from 15 wells, water samples 4 times at different times were collected and examined. Data were analyzed using R and Arc GIS software. According to the calculated correlation coefficients, the highest correlation Coefficient belonged to TDS-EC while HCO$_3^-$ and Cl$^-$ showed low and weak correlations. However, Na$^+$, Mg$^{2+}$, K$^+$, Ca$^{2+}$ exhibited good positive correlations with EC and TDS. The results show that the water in the study area at the time of the study was based on the WHO standards and appropriate for drinking.

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How data was acquired
Analysis for each sampling point was performed for 4 times at different times that included calcium, magnesium, chloride, temporary and permanent hardness, pH and electrical conductivity (EC). Sulfate analyzed by Hatch spectrophotometer (DR 5000). Total hardness was determined by EDTA method by titration method and TDS was measured gravimetrically.

Data format
Raw, Analyzed

Experimental features
The parameters mentioned in this paper have been analyzed according to Standard Methods for the Examination of Water and Wastewater.

Data source location
Zanjan, Zanja province, Iran

Data accessibility
Data are included in this article and supplement file Excel and ArcGIS.

Value of the data
- Determination of the physical and chemical parameter including Ca\(^{2+}\), Mg\(^{2+}\), EC, pH, TDS, TH, HCO\(_3\)\(^-\), Na\(^+\), K\(^+\), Cl\(^-\), SAR, %Na and SO\(_4\)\(^{2-}\) in ground water was conducted in Zanjan city, Iran.
- Data of this study with Arc GIS can help to better understand the quality of groundwater in this area.
- The results show that the water in the study area at the time of the study was based on the WHO standards and appropriate for drinking.

1. Data

Monitoring of physical and chemical characteristics of ground water including Ca\(^{2+}\), Mg\(^{2+}\), EC, pH, TDS, TH, HCO\(_3\)\(^-\), Na\(^+\), K\(^+\), Cl\(^-\), SAR, %Na and SO\(_4\)\(^{2-}\) was done in Zanjan city, Iran. In this regard data were analyzed using R and Arc GIS software. Table 1 summarizes analysis of the groundwater samples at the study area. Table 2 shows results of Pearson correlation matrix for 10 chemical constituents of the groundwater samples. The TDS and EC level in the study area depicted using the ArcGIS software, as shown in Fig. 1. In this figure, the brighter range represents fewer values, and the darker range is a large value.

2. Experimental design, materials and methods

2.1. Study area description

Zanjan is the capital of Zanjan province in Iran and located about 80 miles south from the Caspian Sea. That coordinates are 36°40’27.6204”N and 48°29’4.0812”E. 15 wells were selected as sampling points. Study area and the sampling points are shown and in Fig. 2.

2.2. Materials and methods

For assessing the physicochemical parameters, from 15 wells, water samples 4 times at different times during the year were collected from Zajan city in 2016. Analysis included calcium, magnesium, chloride, temporary and permanent hardness, pH and electrical conductivity (EC) [1–5]. Sulfate analyzed by Hatch spectrophotometer (DR 5000) [6–10]. Total hardness was determined by EDTA method by titration method and TDS was measured gravimetrically. All of parameters in this paper have been analyzed according to handbook of Standard Methods for the Examination of Water and Wastewater [1–12]. Since a simple a method for evaluating the changes of high sodium is the Sodium Adsorption Ratio (SAR) and the sodium percentage (Na %). The excess concentration of sodium in
Table 1
Groundwater quality parameters analyzed in this study.

| Well no | UTM | EC (μmhos/cm) | TDS (mg/l) | pH | meq/l | HCO$_3^-$ | Cl$^-$ | SO$_4^{2-}$ | Ca$^{2+}$ | Mg$^{2+}$ | Na$^+$ | K$^+$ | SAR | Na% | TH |
|---------|-----|---------------|------------|----|-------|----------|-------|------------|----------|----------|-------|-------|-----|-----|-----|
| P1      | 4074050 | 257400      | 236        | 145 | 7.77  | 1.64     | 0.25  | 0.415     | 1.4      | 0.44     | 0.42  | 0.01  | 0.44 | 18.60 | 92  |
| P2      | 4064250 | 261300      | 1952       | 1245 | 7.47  | 4.28     | 4.08  | 10.44     | 5.95     | 6.18     | 6.80  | 0.06  | 2764 | 35.81 | 606.35 |
| P3      | 4073050 | 263000      | 665        | 425  | 7.78  | 2.04     | 1.24  | 3.03       | 3.09     | 1.04     | 2.23  | 0.03  | 1553 | 34.88 | 206.95 |
| P4      | 4057850 | 264850      | 1568       | 1005 | 7.45  | 3.72     | 1.93  | 9.33       | 4.27     | 3.75     | 7.09  | 0.06  | 3548.5 | 46.76 | 401.15 |
| P5      | 4071800 | 265250      | 697.5      | 445  | 7.74  | 2.56     | 0.98  | 3.11       | 2.22     | 0.88     | 3.64  | 0.025 | 2923.5 | 53.80 | 154.95 |
| P6      | 4067000 | 265900      | 518.5      | 325  | 7.84  | 2.56     | 0.78  | 1.61       | 2.87     | 0.9      | 1.23  | 0.02  | 0.8955 | 24.51 | 188.95 |
| P7      | 4063750 | 268100      | 1747       | 1100 | 7.28  | 2.72     | 7.52  | 6.77       | 7.21     | 5.96     | 3.91  | 0.055 | 1059.7 | 19.68 | 658.5 |
| P8      | 4068775 | 268950      | 1962       | 1245 | 7.3   | 5.36     | 4.73  | 8.8        | 9.28     | 4.02     | 5.73  | 0.07  | 2221 | 30    | 664.95 |
| P9      | 4060825 | 270050      | 1039       | 665  | 7.73  | 2.96     | 1.32  | 5.61       | 4.77     | 1.14     | 4.07  | 0.03  | 2378.5 | 40.76 | 295.9 |
| P10     | 4056200 | 271750      | 1040       | 665  | 7.79  | 3.52     | 1.67  | 4.74       | 3.47     | 1.21     | 5.35  | 0.025 | 3505.5 | 53.23 | 233.95 |
| P11     | 4060850 | 272175      | 904        | 570  | 7.19  | 3.28     | 1.74  | 3.65       | 3.87     | 1.57     | 3.29  | 0.05  | 1996 | 37.5 | 272  |
| P12     | 4059000 | 276500      | 1145       | 715  | 7.32  | 4.84     | 2.87  | 3.31       | 5.35     | 2.19     | 3.57  | 0.04  | 1834.5 | 31.91 | 377  |
| P13     | 4060600 | 282475      | 889        | 560  | 7.49  | 4.28     | 1.75  | 2.52       | 4.29     | 1.56     | 2.75  | 0.03  | 1641 | 33.32 | 292.95 |
| P14     | 4053850 | 293375      | 442.5      | 275  | 7.845 | 3.04     | 0.425 | 0.815      | 2.44     | 0.72     | 1.115 | 0.015 | 0.8895 | 26.045 | 157.95 |
| P15     | 4051050.00 | 299800 | 538.33 | 336.67 | 7.72 | 2.93 | 0.90 | 1.33 | 2.40 | 0.95 | 1.87 | 0.02 | 1453.33 | 35.77 | 167.30 |
Table 2
Pearson correlation matrix among the chemical constituents for the groundwater samples.

| Variables | K⁺ | Na⁺ | Mg²⁺ | Ca²⁺ | SO₄⁻ | Cl⁻ | HCO₃⁻ | TDS | EC | TH |
|-----------|----|-----|------|------|------|-----|------|-----|----|----|
| K         | 1.00 |     |      |      |      |     |      |     |    |    |
| Na⁺       | 0.81 | 1.00|      |      |      |     |      |     |    |    |
| Mg²⁺      | 0.90 | 0.70| 1.00 |      |      |     |      |     |    |    |
| Ca²⁺      | 0.82 | 0.62| 0.78 | 1.00 |      |     |      |     |    |    |
| SO₄⁻      | 0.90 | 0.93| 0.84 | 0.75 | 1.00 |     |      |     |    |    |
| Cl⁻       | 0.78 | 0.51| 0.88 | 0.86 | 0.66 | 1.00|      |     |    |    |
| HCO₃⁻     | 0.60 | 0.61| 0.46 | 0.71 | 0.54 | 0.42| 1.00 |     |    |    |
| TDS       | 0.94 | 0.87| 0.91 | 0.89 | 0.95 | 0.83| 0.67 | 1.00|    |    |
| EC        | 0.94 | 0.87| 0.91 | 0.89 | 0.94 | 0.83| 0.67 | 0.99| 1.00|    |
| TH        | 0.91 | 0.70| 0.93 | 0.94 | 0.84 | 0.92| 0.63 | 0.95| 0.96| 1.00|

Fig. 1. The amount of EC and TDS in the samples studied.

Fig. 2. The map and location of sampling points of Zanjan city, Zanjan, Iran.
groundwater creates adverse effects as it reacts with the soil and decreases soil permeability and influences plant growth. Sodium percentage is also widely used to evaluate the suitability of water quality for irrigation. The percentage of sodium solution is calculated from the following formula [2] (Table 3).

\[
Na\% = \frac{Na + K}{Ca + Mg + Na + K} \times 100
\]

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**Transparency document. Supporting information**

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2018.03.059.

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