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ANALYSIS OF DRINKING WATER QUALITY AND ENVIROTMENT HEALTH RISK OF IRON (Fe) POLLUTION FROM DUG WELLS IN THE WORKING AREA OF COMMUNITY HEALTH CENTER IN OGAN KOMERING ILIR REGENCY

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ABSTRACT

Background: Iron is one of the metal parameters regulated in the Minister of Health's regulation regarding clean water and drinking water. Iron can cause health problems if it accumulates in the body. **Methods:** This study is a quantitative descriptive study with an environmental health risk analysis approach through a table-top approach evaluation to see the level of risk of heavy metal Fe in well water of residents in the working area of the Ogan Komering Ilir Regency Health Center. The study design is cross-sectional. This research was conducted in 2023 in the working area of the Ogan Komering Ilir Health Center. **Results:** Intake value based on the minimum Fe content in well water in adults were obtained at 0.00032 mg/kg/day, while in children it was 0.00070 mg/kg/day. The calculation results of the Fe Intake value based on the maximum Fe content in wells for adults were 0.00061 mg/kg/day while in children it was 0.00014 mg/kg/day. Meanwhile, based on the average value, the Intake value for adults was 0.00032 mg/kg/day, and for children it was 0.00070 mg/kg/day, with a Reference Concentration Dose of 0.3 mg/kg/day. The (RQ) value was obtained less than 1 for all calculations based on the intake value. **Conclusion:** The Fe levels in community well water in the Ogan Komering Ilir Community Health Center work area are still below the quality standard and the results of the Risk Quotient calculation in the water are still safe, but continuous monitoring by the Community Health Center is needed.

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INTRODUCTION

Water is the most important resource that cannot be separated from human life in order to survive, therefore the provision of water is very necessary, especially clean water to meet the needs of living things (WHO, 2022). Water is a primary need that plays an important role in the life aspects of all living creatures on earth, including humans. (Maksuk et al., 2022). Clean water is one of the basic needs of humans that is obtained from various sources, depending on local conditions. Therefore, for drinking purposes (including for cooking) water must have special requirements so as not to cause disease in human.

Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023, it states that the fulfillment of drinking water needs must meet the specified requirements, namely that it must be tasteless, odorless, colorless, not contain harmful microorganisms, and not contain heavy metals. (Permenkes RI, 2023). One of the metal elements present in clean water is iron.. Iron is a chemical substance that can contaminate community well water and has an impact on public health if it exceeds health quality standards (Sari et al., 2023).

The iron that accumulates in their bodies causes several deadly diseases, such as: liver cancer and diabetes (Putri & Yudhastuti, 2013). This study aims to analyze the environmental health risks of iron levels in wells and how high the risk quoetient for the next few years..

METHODS

This study is a quantitative descriptive study with an environmental health risk analysis approach through a table-top approach evaluation to see the level of risk of heavy metal Fe in well water of residents in the working area of the Ogan Komering Ilir Regency Health Center. The study design is cross-sectional. This research was conducted in 2023 in the working area of the Ogan Komering Ilir Health Center. This study was to analyze the Fe content of dug well water in one of the health center work areas in Ogan Komering Ilir Regency. Fe examination was carried out at the Laboratory of the South Sumatra Provincial Environmental Service using spectrophotometry to determine the Fe levels. Well water samples were taken from residents' wells in the health center work area as many as 3 samples belonging to residents.

Furthermore, for the purpose of analysis, an environmental health risk analysis was carried out with the following steps: hazard identification, Dose Response Analysis, Exposure Analysis and Risk Level calculation using the formula from Louvar and Louvar (Louvar & Louvar, 1998).

RESULTS

The results of the laboratory examination of Fe levels are presented in the table below:

Tabel 1. Results of Examination of Fe Levels in Community Dug Well Water in the Ogan Komering Ilir Health Center Work Area

Variables	Mean	Nilai Min-Max
Kadar Fe (mg/l)	0.013	0.01-0.02

Table 2. Intake and Risk Quotient (RQ)Calculation Results

Fe Levels (mg/l)	Intake (mg/kg/day)		Risk Quotient (RQ)	
	Children	Adults	Children	Adults
0.01	0.00070	0.00031	0.02	0.001
0.013	0.00014	0.00061	0.002	0.001
0.02	0.00070	0.00032	0.0004	0.002

The calculation results of the Fe Intake value based on the minimum Fe content in well water in adults were obtained at 0.00032 mg/kg/day, while in children it was 0.00070 mg/kg/day. The calculation results of the Fe Intake value based on the maximum Fe content in wells for adults were 0.00061 mg/kg/day while in children it was 0.00014 mg/kg/day. Meanwhile, based on the average value, the Intake value for adults was 0.00032 mg/kg/day, and for children it was 0.00070 mg/kg/day, with a Reference Concentration Dose of 0.3 mg/kg/day. The (RQ) value was obtained less than 1 for all calculations based on the intake value. This means that the iron content in dug wells in the Community Health Center work area in Ogan Ilir Regency is still safe for the next few years.

DISCUSSION

The results of the Fe level examination in dug wells are less than the environmental health quality standards of the Minister of Health Regulation No. 2 of 2023. Fe is a non-carcinogenic metal group, but if the Fe value exceeds the quality standard, it can affect health problems. The RQ calculation result is less than 1 and the intake value is below the Reference Dose value.

Although the Fe content in well water is less than the standard quality standard, this condition cannot be said to be safe because there are many factors that can cause Fe levels to increase.

The results of the study in Sidoarjo District reported that the Fe content exceeded the limit, namely at a well distance of 0–50 m with a total of 5 wells with an average Fe of 1.694 mg/l, and a distance of 51–100 m with a total of 6 wells with an average Fe of 0.797 mg/l (Putri & Yudhastuti, 2013). According to the results of a study in Ibul Village, Ogan Ilir Regency, it was shown that the iron concentration had an average value of 0.414 mg/L (Sunarsih et al., 2018). The content of heavy metals in dug well water is influenced by the activities around the well. This is proven by the results of a study conducted around the final waste disposal site in the city of Palembang, where several metals were found in well water including manganese, iron, chromium, lead, zinc and cadmium (Maksuk, 2012; Maksuk et al., 2023; Maksuk & Suzanna, 2018; Nora et al., 2022; Ramadhan et al., 2022). In addition, levels of Mn, Fe and Cr were found in the Kauman batik home industry area in Sokaraja, Banyumas (Nugrayani et al., 2023). Concentrations of nitrate, nitrite, manganese, and iron were also found in groundwater in Bandung City (Ananda, 2017).

This research is in accordance with the results of a study conducted in Kelambir Village with the RQ value at each station from each hamlet on exposure to iron (Fe) contained in the well water of residents obtained an RQ value <1, which means that lifetime exposure does not pose a risk of causing health effects (Meirindany et al., 2023).

CONCLUSION

Measurement of Fe (Iron) concentration of dug wells in the area of health center in Ogan Komering Ilir district from 3 sampling locations, the Fe concentration is still below the maximum limit of 1 mg/L. From the results of the RQ calculation, it was obtained less than 1, which means that the dug well is still safe for consumption by the community. The Fe levels in community well water in the Ogan Komering Ilir Community Health Center work area are still below the quality standard and the results of the Risk Quotient calculation in the water are still safe, but continuous monitoring by the Community Health Center is needed.

CONFLICT OF INTEREST

The author declare that no conflict of interests in this study.

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