



Clean Water Treatment Training and Its Relation to Organ Damage Prevention at Al-Jihad Islamic Boarding School

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ABSTRACT

Access to clean water in Indonesia remains a challenge, especially in rural areas and educational environments such as Islamic boarding schools. Consuming contaminated air in the long term from shallow wells can cause damage to organs, such as the kidneys, liver, and digestive tract. Therefore, the availability of sufficient and affordable clean water is very important for the survival and well-being of society. The approach in the Islamic boarding school environment, through community service activities and conducting counseling related to clean water processing and its relationship to preventing organ damage, is very important to create collective awareness in maintaining the availability of clean water. The implementation was carried out on May 17, 2025, at the Al-Jihad Islamic Boarding School in Surabaya. The series of activities began with filling out a pre-test, counseling through interactive lectures, and then continued with filling out a post-test to transmit the students' understanding after participating in this activity. The activity showed an increase in students' knowledge about water quality (management) and its impact on health ($p < 0.05$). Providing counseling to students at the Al Jihad Islamic Boarding School in Surabaya was able to increase students' knowledge about water quality (management) and its impact on health.

Keywords: Clean water; Islamic boarding schools; organ health

INTRODUCTION

The Al-Jihad Student Islamic Boarding School is located at Jl. Jemursari Utara III No. 9, Jemur Wonosari, Wonocolo District, Surabaya City, East Java. Currently, Al-Jihad Islamic Boarding School has over 300 students from various regions in East Java and outside Java. The boarding school boasts a variety of educational and religious facilities, including a large mosque, a hall for religious study, dormitories for male and female students, and other adequate supporting facilities to support teaching and learning activities and develop the students' character.

Poor water quality is a serious environmental health problem, particularly in densely populated areas such as Islamic boarding schools (ponpes). Contaminated water can transmit various diseases, such as diarrhea, typhoid, and gastrointestinal infections, and can damage organs if consumed over a long period (WHO, 2021). In Indonesia, access to clean water remains a challenge, particularly in rural areas and educational settings such as Islamic boarding schools. Data from the Indonesian Ministry of Health (2020) shows that approximately 30% of Indonesians still struggle to access clean

water, a situation also experienced by several Islamic boarding schools, including the Al-Jihad Islamic Boarding School. Furthermore, the impact of population growth is the decline in water quality, which can be caused by human activity

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itself, making clean water shortages a common problem (Akhirul et al., 2020).

As religious-based educational institutions, Islamic boarding schools (*pesantren*) have three main functions: education, religious outreach, and social empowerment. In addition to serving as learning resources, Islamic boarding schools also provide dormitories for their students (Santoso, 2024).

Impure water can be a source of disease and death. The Centers for Disease Control (CDC) report on waterborne disease outbreaks linked to drinking water reports that annually in the United States, waterborne pathogens cause approximately 7.15 million illnesses, 118,000 hospitalizations, and 6,630 deaths, resulting in US\$3.33 billion in direct health care costs (Kunz et al., 2024).

Poor water quality is a serious environmental health problem, particularly in densely populated areas such as Islamic boarding schools (*pesantren*). Studies conducted by international bodies such as UNICEF report that poor drinking water quality can be a source of various diseases. Viruses found in unsafe drinking water have been linked to various diseases, including diarrhea, cholera, and other gastrointestinal disorders. Clean water, or drinking water, is crucial for human life and can damage organs if consumed long-term (Hidayah, 2024).

Long-term consumption of contaminated water from shallow wells can cause damage to organs such as the kidneys, liver, and digestive tract. Harmful substances such as heavy metals, pathogenic bacteria, and chemical compounds can accumulate in the body and cause serious health problems (Alfian et al., 2021).

Therefore, efforts to improve water quality and provide education on clean water treatment are crucial to prevent these negative impacts, especially for the male and female students at the Al Jihad Islamic Boarding School.

LITERATURE OR CONCEPTUAL REVIEW

Clean water is the environmental health quality standard for water for sanitation and hygiene purposes, encompassing physical, biological, and chemical parameters, which can be either mandatory or additional. Mandatory parameters must be checked periodically in accordance with statutory provisions, while additional parameters are only required to be checked if geohydrological conditions indicate potential contamination related to the additional parameters. Minister of Health Regulation No. 32 of 2017 concerning Environmental Health Quality Standards and Water Health Requirements for Sanitation and Hygiene Purposes, Swimming Pools, *Solus Per Aqua*, and Public Baths, states that healthy drinking water must meet physical, chemical, and biological requirements. Some of these requirements include water that must be clear or not cloudy, colorless, tasteless, have a neutral pH, be free from toxic chemicals, have low hardness, and be free from and must not contain pathogenic bacteria such as *Escherichia coli*. The regulation clearly states that one of the requirements for drinking water quality, based on chemical parameters, is hardness (Minister of Health Regulation No. 2017).

The characteristics of water that is suitable for consumption are clear, not cloudy, odorless, tasteless, no sediment, temperature 10-20, does not contain chemicals, has a pH of 6.5-9.2, and should not contain coliform bacteria and *Escherichia coli* bacteria. The best time for health to consume drinking water is when waking up in the morning, before eating, before and after exercise, before bathing, before going to bed, and when feeling tired from work. Briawan et al. (2011) stated that the recommended water requirements in balanced nutrition guidelines can change over time. Water requirements depend on several factors that play an important role, such as age, gender, frequency of physical activity, and environmental factors. According to Metta (2011), a human body that lacks water will cause various diseases, including back pain, rheumatism, gastrointestinal ulcers, neck bone pain, high blood pressure, high cholesterol, excess body weight, asthma, diabetes, stroke, kidney stones, and constipation.

MATERIALS AND METHODS

A community service activity was conducted at the Al-Jihad Student Islamic Boarding School in Surabaya on May 17, 2012. The activity was carried out and attended by 40 students from the Al-Jihad Islamic Boarding School in Surabaya. With its existing facilities and easy access, the Al-Jihad Islamic Boarding School is a strategic partner in implementing community service programs through outreach and education for students aimed at increasing knowledge about water quality (management) and its impact on health and how to identify water that is suitable for consumption.

The activity implementation consists of several stages: (1) Pre-Information: Before the outreach begins, students will be asked to complete a questionnaire. The questionnaire serves as a 10-minute pretest. (2) Outreach: The outreach will be conducted by a team of lecturers and competent health workers. The counseling material includes information on water quality (management) and its impact on health, how to identify water that is suitable and unsuitable for consumption, and water management that can prevent organ damage at the Al-Jihad Islamic boarding school. This counseling will last for 45 minutes, followed by a 15-minute question and answer session. (3) Post-Counseling: After the counseling session and demonstration of traditional games, students will fill out a 10-minute post-test to evaluate their understanding after participating in this program.

RESULTS AND DISCUSSION

The outreach program was successfully implemented and involved 40 male and female students at the Al-Jihad Islamic Boarding School in Surabaya. The outreach consisted of several sessions, starting with topics on water quality (management) and its impact on health, how to identify water that is suitable for consumption, and water management that can prevent organ damage. This session was followed by a question and answer session. All students participated enthusiastically. Furthermore, they arrived on time and followed the program from beginning to end, demonstrating their interest in participating. They were also active during the outreach, actively asking questions of the presenters about the material presented. At the end of the program, a post-test was conducted to assess their understanding.

The students' knowledge of water quality (management) and its impact on health before and after the outreach program showed an average pre-test score of 85.5 and a post-test score of 90.75, with an average increase of 5.25. The results were then subjected to a non-parametric Wilcoxon signed-rank test analysis due to the non-normal distribution of the data. The results of the Wilcoxon signed-rank test analysis are shown in Table 1.

Table 1. Results of the analysis test of students' knowledge about water quality (management) and its impact on health before and after counseling.

Test	Mean	Min	Max	P Value
Pre-Test	85,5	70	100	0.001
Post-Test	90,75	80	100	

Based on the results of the statistical analysis above, it is known that there was a significant increase in students' knowledge ($p < 0.05$) regarding water quality (management) and its impact on health before and after the counseling. health education

DISCUSSION

The main sources of water pollution include industrial waste, agricultural runoff, and urban runoff. Industrial activities release pollutants into water bodies, including heavy metals (mercury, lead, and chromium) and other toxic substances (Ahmed et al., 2021). Agricultural runoff, considered the largest source of water pollution, includes pesticides, fertilizers, and animal waste (Nzengung and Gugolz, 2022).

Basic school sanitation is a minimum environmental health requirement that every school must have to meet the needs of students. The scope of basic sanitation includes clean water facilities, latrines, waste disposal facilities, and wastewater disposal facilities (Rahmah & Ganing, 2022).

Unsafe water has a negative impact on human health. According to UNESCO's 2021 World Water Development Report, approximately 829,000 people die annually from diarrheal diseases caused by unsafe drinking water, sanitation, and hand hygiene, including nearly 300,000 children under the age of five, representing 5.3 percent of all deaths in this age group (Lin, 2022).

In a comparative study of tap water, purified water, and bottled water, tap water was found to be a significant source of gastrointestinal diseases. Lack of water and sanitation services also increases the incidence of diseases such as cholera, trachoma, schistosomiasis, and helminthiasis. Data from studies in developing countries demonstrate a clear link between cholera and contaminated water, and household water treatment and storage can reduce cholera (Lin, 2022).

Regarding environmental hygiene, knowledge of hygiene is essential for every individual, especially students in school environments. With sufficient knowledge of environmental hygiene, an individual can maintain healthy lifestyle habits, thereby creating optimal well-being. Therefore, educational institutions are the primary forum for teaching the younger generation the importance of a healthy and clean environment (Santoso, 2024).

Health education is conducted to convey health messages to the community or target groups according to the health problems faced by those groups. Public health education is defined as the process of change, growth, and development of individuals toward physical, spiritual, and social harmony and balance within their environment, enabling them to be capable and responsible for addressing their own health problems and those of their community (Iyong et al., 2020).

Health education aims to promote changes from unhealthy to healthy behaviors. This is achieved by disseminating health messages to instill and convince target groups so they understand, and indirectly influencing their attitudes and behavior (Iyong et al., 2020).

CONCLUSIONS

Providing counseling to students at the Al Jihad Islamic Boarding School in Surabaya has increased their knowledge of water quality (management) and its impact on health. Improving student knowledge as an effort to improve water quality and providing education on clean water treatment is crucial to preventing organ damage.

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Conflict of Interests

The authors declared that no potential conflicts of interest with respect to the authorship and publication of this article.

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