

Kandungan Pb pada air hujan selain berasal dari atap seng, juga bersumber dari lingkungan luar, misalnya kegiatan industri, kendaraan bermotor dan pembakaran lahan. Selanjutnya bahan pencemar Pb tersebut larut, kemudian masuk ke dalam Bak Penampungan Air Hujan (PAH) dan digunakan sebagai sumber air minum masyarakat. Adanya pencemaran atau paparan Pb pada air hujan berdampak pada kesehatan masyarakat, yaitu pada orang dewasa dapat menimbulkan gangguan enzim dalam tubuh, anemia, gangguan jiwa dan hipertensi, sedangkan pada anak-anak menurunkan intelegensia (IQ), *hyperactivity*, Berat Bayi Lahir Rendah (BBLR) dan prematur.

Tujuan penelitian, yaitu untuk: (1) menganalisis perbedaan kandungan Pb air hujan di daerah perkotaan dan pedesaan, (2) mengevaluasi perbedaan kandungan Pb pada air hujan yang ditampung langsung dan melalui pengaturan waktu penampungan dari rumah beratap seng, (3) mengevaluasi pengaruh filtrasi pasir kerang dan absorpsi karbon aktif tempurung kelapa dalam tabung filter dengan penurunan kadar Pb, kekeruhan dan pH air hujan, dan (4) menganalisis korelasi antara tingginya paparan Pb air hujan terhadap gangguan kesehatan masyarakat, serta mengevaluasi perbedaan lama waktu bermukim, pekerjaan dan merokok dengan paparan Pb urin (gangguan kesehatan) masyarakat yang menggunakan air hujan sebagai sumber air minum.

Jenis penelitian ini adalah *Quasi eksperiment* dengan rancangan *Times Series with control* dan *Observational study* dengan *Cross Sectional Design*. Penelitian ini dilakukan di Pontianak dan Kubu Raya Kalbar dengan dua wilayah sasaran yaitu perkotaan dan pedesaan. Data yang dikumpulkan meliputi data primer dan sekunder. Teknik pengambilan dan pengumpulan sampel dilakukan beberapa tahap, yaitu: (1) menentukan jumlah sampel untuk pemeriksaan Pb air hujan, pH dan kekeruhan air hujan (2) mendesain alat pengolahan air hujan dengan filtrasi pasir kerang dan absorpsi karbon aktif dalam tabung filter, (3) melakukan pemeriksaan kandungan Pb, kekeruhan dan pH air hujan yang ditampung saat hujan dan telah diolah dengan filtrasi pasir kerang dan absorpsi karbon aktif dalam tabung filter di laboratorium dan (4) melakukan analisis data secara deskriptif dan analitik.

Hasil penelitian menunjukkan bahwa: (1) Rerata kadar Pb, kekeruhan dan pH air hujan sebelum diaakukan pengolahan dengan filtrasi pasir kerang dan absorpsi karbon aktif tempurung kelapa dalam tabung filter tergolong tinggi, yaitu kadar Pb sebesar 131,7 µg/l, kekeruhan 20 NTU dan pH 5,2. Setelah pengolahan rerata kadar Pb air hujan 0,71 µg/l, kekeruhan 5,66 NTU dan pH 6,9. Hasil ini sesuai persyaratan air minum Permenkes No. 492/2010 dan standar WHO (2011) tentang *Guidelines for Drinking Water Quality*, (2) Pengolahan air hujan dengan filtrasi dan absorpsi karbon aktif sangat efektif untuk menurunkan timbal (Pb) 99,47%, kekeruhan 71,65% dan pH air sebesar 25,76%. Analisis statistik diketahui bahwa kadar Pb, kekeruhan dan pH air hujan setelah dilakukan pengolahan lebih kecil dibandingkan dengan sebelum pengolahan ($p=0,000$)

Untuk itu disarankan, kepada: (1) masyarakat Pontianak dan Kubu Raya sebelum memanfaatkan air hujan sebagai sumber air minum perlu dilakukan pengolahan. Pengolahan air hujan dapat dilakukan dengan filtrasi pasir kerang dan absorpsi karbon aktif tempurung kelapa dalam tabung filter, (2) Puskesmas, Dinkes, Pemerintah Kota Pontianak dan Pemda Kabupaten Kubu Raya dapat melakukan penyuluhan dan pembimbingan dalam penyediaan sarana pengolahan air hujan secara sederhana dengan filtrasi pasir kerang dan absorpsi karbon aktif tempurung kelapa dalam tabung filter dan pembinaan dengan melakukan pemberdayaan masyarakat dalam pengelolaan air hujan sebagai sumber air minum.

Kata Kunci: Timbal (Pb), Kekeruhan, Air Hujan, Filtrasi, Pasir Kerang, Absorpsi, Karbon Aktif Tempurung Kelapa dan Kesehatan Masyarakat.

ABSTRACT

The Pb level in rainwater, in addition to coming from air pollution resulted from industrial activities, motor vehicles and land clearing, also comes from zinc roofs. Moreover, the Pb contaminant dissolves in the rainwater, gets into the rainwater storage tank and is used as a source of public drinking water. The rainwater Pb exposure affects public health. The impacts of Pb pollution are among others the cases of low birth weight and premature infants, lower intelligence and hyperactivity in children, and in adults it can cause enzyme depletion in the body, anemia, mental disorder, and increased blood pressure.

This research aims to: (1) evaluate the content of Pb, pH and turbidity of rainwater according to regions and rainwater storage settings; (2) analyze the effectiveness of Pb processing, turbidity and pH level of rainwater with clam sand filtration and absorption with coconut shell activated carbon in the filter canister; (3) analyze the correlation between rainwater Pb exposure and public health problems; and (4) evaluate the risk factors related to health problems of people who use rainwater as a source of drinking water.

This research was carried out using two designs i.e. quasi-experiment study with times series design with control and observational with cross sectional design. This research was conducted in urban area of Pontianak and rural area of Kubu Raya West Kalimantan. Data were collected using measurement, interviews and direct observation. The data were collected through several stages, namely (1) determining the number of samples for examination of rainwater Pb, pH and turbidity; (2) designing the rainwater processing tool with clam sand filtration and absorption with coconut shell activated carbon in the filter canister, (3) examination of Pb, turbidity and pH level of rain water before and after processing in the laboratory; and (5) the data were analyzed using a computer program, either descriptively or analytically.

The results showed that: (1) the concentration of lead (Pb) and turbidity before oyster sand filtration treatment and absorption with coconut shell activated carbon was relatively high at 131.77 µg/l and turbidity of 20 NTU and low rainwater pH of 5.16. After treatment, the rainwater Pb decreased by 0.71 µg/l, turbidity of 5.66 NTU and pH increased to 6.95, and the results were in compliance with drinking water requirements set by Health Ministerial Regulation No. 492/2010 and WHO standards (2011) on the Guidelines for Drinking Water Quality, (2) Treatment of rainwater with clam sand filtration and absorption with coconut shell activated carbon was effective in lowering lead (Pb) by 99.47% and turbidity by 71.65 %, and raising the rainwater pH by 4.78% ; and (4) the results of the analysis showed that Pb level and turbidity after processing decreased and pH was higher than before treatment ($p = 0.000$). High levels of rainwater Pb had correlation with public health problems ($r = 0.3$) and the risk factors related to health problems were the length of settlement and smoking habit ($p = 0.00$).

It is therefore recommended that: (1) people in Pontianak and Kubu Raya should treat rainwater before using it as drinking water. Rainwater treatment can be done with clam sand filtration and absorption with coconut shell activated carbon in a filter canister; (2) Community Health Centers and Health Offices can carry out coaching in providing rainwater treatment in a simple way namely by using clam sand filtration and absorption with coconut shell activated carbon in a the filter canister, and conduct community empowerment in rainwater treatment as a source of drinking water.

Keywords: Lead (Pb), Turbidity, Rainwater, Management of Storage Time, filtration, clam sand, Absorption, and Activated Carbon, Coconut Shell and Public Health