

RINGKASAN

Kadmium merupakan salah satu bahan pencemar di lingkungan. Cemaran kadmium antara lain berasal dari berbagai limbah industri tambang, keramik, dan pengelasan logam. Kadmium dalam tubuh akan memicu pembentukan radikal bebas dan bersifat toksik. Efek kadmium pada ginjal mampu meningkatkan kadar kreatinin dan asam urat. Kadmium yang masuk kedalam tubuh baik melalui inhalasi maupun oral akan berikatan dengan protein metalotionin membentuk ikatan Cd+Mt. Ikatan Cd+Mt akan terlepas setelah melalui tubulus proksimal dalam bentuk Cd^{2+} yang akan terakumulasi di ginjal. Keberadaan Cd pada ginjal menyebabkan penurunan laju filtrasi glomerulus yang ditandai dengan peningkatan kadar kreatinin. Cd^{2+} juga mengaktivasi enzim xantin oksidase yang mengubah xantin menjadi asam urat sehingga terjadi peningkatan kadar asam urat dalam darah. Tujuan penelitian adalah untuk mengetahui efek subletal paparan Cd terhadap peningkatan kadar kreatinin dan asam urat tikus putih serta mengetahui dosis Cd yang mampu memberikan efek subletal paling tinggi terhadap peningkatan kadar kreatinin dan asam urat tikus putih.

Penelitian dilakukan menggunakan metode eksperimental dengan Rancangan Acak Lengkap (RAL) yang terdiri dari 4 perlakuan dan 6 kali ulangan yakni P_0 (tanpa induksi $CdSO_4$), P_1 (diinduksi $0,007 \text{ mg.kg}^{-1}CdSO_4$ 14 hari), P_2 (diinduksi $0,014 \text{ mg.kg}^{-1} CdSO_4$ 14 hari), dan P_3 (diinduksi $0,028 \text{ mg.kg}^{-1} CdSO_4$ 14 hari) secara intra peritoneal (i.p). Parameter penelitian adalah kadar asam urat dan kreatinin tikus. Sampel darah diambil saat *post test* diukur pada hari ke-15. Kadar kreatinin dan asam urat dianalisis dengan analisis ragam (ANOVA) pada tingkat kesalahan 5% dan 1% dilanjutkan dengan uji DMRT untuk mengetahui dosis Cd yang memberikan efek subletal paling tinggi terhadap peningkatan kadar kreatinin dan asam urat tikus putih.

Hasil analisis ragam menunjukkan bahwa induksi subletal kadmium berpengaruh nyata ($p < 0,05$) terhadap peningkatan kreatinin dan sangat nyata ($p < 0,01$) terhadap peningkatan kadar asam urat dalam darah dan dosis subletal Cd $0,028 \text{ mg.kg}^{-1}$ BB merupakan dosis yang paling berpengaruh terhadap peningkatan kadar kreatinin dan asam urat di dalam darah tikus putih. Kesimpulan pada penelitian ini adalah induksi subletal Cd mampu meningkatkan kadar kreatinin dan asam urat dalam darah tikus putih melebihi batas normal. Semakin tinggi dosis subletal Cd semakin tinggi pula kadar kreatinin dan asam urat. Dosis subletal Cd $0,028 \text{ mg.kg}^{-1}$ BB memberikan efek paling tinggi terhadap peningkatan kadar kreatinin dan asam urat di dalam darah tikus putih.

Kata kunci: Kadmium, Metallothionein, Kreatinin, Asam Urat.

SUMMARY

Cadmium is one of contaminants in environment. Contamination of cadmium, among others, come from various wastes of mine, ceramics, and metal welding industries. The present of cadmium in human body is toxic and will trigger the formation of free radicals. The effect of cadmium could increase the levels of urea and creatinine on kidney. Cadmium entered into the body either through inhalation and oral will bind to metallothionein protein forming Cd+Mt bound. Cd+Mt bound will detached after passing proximal tubules in the form of Cd^{2+} that will accumulated in kidney. The present of Cd in kidney causing the decrease of filtration of glomerulus that marked with the increase of creatinin level. Cd^{2+} also activating xantin oxidase enzyme that change xantin becomes uric acid so that the increase of uric acid level on blood was happened. This study aims to know the sublethal effect of heavy metal of cadmium towards creatinine and uric acid levels on white rat blood and knowing the dose of Cd which is able to provide the highest sublethal effect on increase creatinine and uric acid levels in white rat.

This study was done using experimental method with Completely Randomized Design (CRD) consists of 6 treatments and 4 replications, i.e. P_0 (without $CdSO_4$ induction), P_1 (induced by $0.007 \text{ mg.kg}^{-1}LD_{50} \text{ CdSO}_4$), P_2 (induced by $0.014 \text{ mg.kg}^{-1}LD_{50} \text{ CdSO}_4$), and P_3 (induced by $0.028 \text{ mg.kg}^{-1} LD_{50} \text{ CdSO}_4$) with intraperitoneal (i.p) method. Parameters of the study were rat urea and creatinine levels. Blood samples were taken at post test measured on day 15. Levels of urea and creatinine were analyzed by Analysis of Variance (ANOVA) at 5% and 1% error rates, continued with DMRT test to knowing Cd dose that giving highest sublethal effect towards the increase of creatinine and uric acid of white rat.

The results of the analysis of variance showed that sublethal cadmium induction had a significant effect ($p < 0.05$) on creatinine increase and was very significant ($p < 0.01$) to increase levels of uric acid in the blood, sublethal Cd dose of $0.028 \text{ mg.kg}^{-1} \text{ BB}$ is the most influential dose to increase creatinine and uric acid levels in the blood of white rats. The conclusion of this study was that sublethal Cd induction was able to increase creatinine and uric acid levels in the blood of white rats exceeding normal limits. The higher the sublethal Cd dose, the higher creatinine and uric acid levels will be. Sublethal dosage of Cd is $0.028 \text{ mg.kg}^{-1} \text{ BB}$ is the highest dose of increased creatinine and uric acid levels in the blood of white rats.

Keywords: Cadmium, Metallothionein, Creatinin, Uric Acid.