

RINGKASAN

Embrio dan larva ikan nilem (*Osteochilus vittatus*) sensitif terhadap pengaruh lingkungan termasuk keberadaan logam berat yang berada di perairan salah satunya adalah krom heksavalen (Cr(VI)). *Potassium dichromate* merupakan salah satu contoh Cr(VI) yang mudah larut dalam air. Logam berat ini diketahui dapat menyebabkan abnormalitas dan kematian pada embrio dan larva ikan. Organ digesti larva ikan memiliki peran sangat penting terhadap kelangsungan hidup larva ikan. Tujuan penelitian ini untuk mengevaluasi perkembangan organ digesti embrio dan larva ikan nilem dalam medium yang mengandung *potassium dichromate* dan untuk mengetahui batas aman konsentrasi *potassium dichromate* untuk perkembangan organ digesti embrio dan larva ikan nilem. Metode penelitian secara eksperimental menggunakan Rancangan Acak Lengkap dengan 5 perlakuan, yaitu 5 konsentrasi *potassium dichromate* terdiri atas 0 ppm, 20 ppm, 40 ppm, 60 ppm, dan 80 ppm. Parameter yang diamati meliputi pewaktuan untuk pembentukan organ digesti, luas area yolk larva, pewaktuan inisiasi pelipatan saluran digesti, diameter intestin, jumlah dan tinggi vili intestin, serta panjang standar larva ikan nilem. Perkembangan organ digesti embrio dan larva dievaluasi dengan pengamatan morfologi dan pembuatan sediaan histologi irisan seri menggunakan metode parafin dengan pewarnaan Hematoxilin-Eosin. Data dianalisis menggunakan Anova satu arah dilanjutkan uji Tuckey.

Hasil penelitian menunjukkan embrio ikan nilem mulai membentuk *endoderma solid rod* pada tahapan organogenesis ($738 \pm 5,24$ menit). Perkembangan organ digesti terlihat jelas pada larva. Larva umur 1 hari memiliki intestin berlumen dengan sel berbentuk kuboid. Struktur penyusun hepar teridentifikasi pada larva umur 2 hari, sel intestin telah berdiferensiasi menjadi berbentuk kolumnar. Larva umur 3 hari memperlihatkan pembentukan vili intestin di bagian anterior intestin serta beberapa di bagian median dan posterior. Jumlah dan tinggi vili intestin bertambah pada larva umur 4 hari, disertai dengan perkembangan lamina propria. Hasil analisis statistik menunjukkan *potassium dichromate* pada konsentrasi 80 ppm memperlambat perkembangan embrio, laju penyerapan yolk pada larva ikan, serta pertumbuhan larva ikan yang diindikasikan dengan panjang standar larva ikan yang lebih pendek dibandingkan dengan larva kontrol. *Potassium dichromate* tidak secara signifikan berpengaruh terhadap inisiasi *digestive tube coiling*, diameter intestin, jumlah dan tinggi vili intestin pada larva normal namun pada larva abnormal terlihat keterlambatan perkembangan organ digesti. Berdasarkan hasil penelitian disimpulkan bahwa pemberian *potassium dichromate* memperlambat perkembangan organ digesti embrio dan larva ikan nilem (*O. vittatus*). *Potassium dichromate* pada konsentrasi 20-80 ppm tidak mempengaruhi struktur organ digesti larva ikan nilem namun konsentrasi 80 ppm mempengaruhi fungsi organ tersebut. Batas aman konsentrasi *potassium dichromate* untuk perkembangan organ digesti embrio dan larva ikan nilem (*O.vittatus*) adalah 60 ppm.

Kata kunci : embrio dan larva, ikan nilem, *potassium dichromate*, organ digesti.

SUMMARY

The embryo and larvae of bonylip barb (*Osteochilus vittatus*) are sensitive to environmental factors in the waters including heavy metal. One of the heavy metals frequently found in the waters is chromium which potentially cause abnormality even death in the fish embryo and larvae. Hexavalent chromium is the most toxic form of chromium, this could be found in form of potassium dichromate. Digestive organs are very important for fish survival. The aims of this research were to evaluate the development of digest organs in bonylip barb embryos and larvae kept in the medium containing potassium dichromate and to determine the concentration of potassium dichromate suitable for normal development of digest organs in bonylip barb embryos and larvae. This research was conducted experimentally using completely randomized design with 5 concentrations of potassium dichromate consisted of 0 ppm (control), 20 ppm, 40 ppm, 60 ppm, and 80 ppm with 8 replication. Quantitative development of the digestive organs was measured based on cumulative time for digest organ development, the rate of yolk absorption, the time of intestine coiled initiation, diameter of intestine, the number and height of intestinal villi, and standar-length of fish larvae. Development of digest organs was evaluated based on morphological and histological features of paraffin-embedded tissues stained with hematoxilin-eosin. The data were analyzed using one way anova followed by tuckey test.

The research results showed that the bonylip barb embryo has formed the endoderma solid rod at organogenesis stage ($738 \pm 5,24$ minutes p.f). Development of the digest organs proceed at the larvae. At the hatching day (0 dpf) the intestinal tube has developed a small lumen lined with cuboidal cells. On 2 dpf larvae, hepatic tissue was identified and the cells lining the intestinal tube has transformed into the columnar cells. On 3 dpf larvae, the intestinal villi was identified in the anterior part of intestin and in several area of the median and posterior intestine. The number and height of the intestinal villi increased in 4 dpf larvae, lamina propria was identifiable at this age. The statistical analysis showed that potassium dichromate at concentration 80 ppm significantly slowed the embryonic development, the rate of yolk absorption in fish larvae, and larval growth as indicated by shorter standard length of the larvae compared to the control larvae. Potassium dichromate did not significantly affect the initiation of digestive tube coiling, intestinal diameter, number and height of villi intestin in normal larvae but it caused delay in development of digestion organ in abnormal larvae. Based on the results it was concluded that potassium dichromate slowed the development of digestive organs of bonylip barb (*O. vittatus*) embryo and larvae. Potassium dichromate at a concentration of 20-80 ppm did not affect the structure of digestion organs of bony lip barb larvae but at 80 ppm this substance affected the function of these organs. The safe limit of potassium dichromate concentration for normal digestive organs development in the bonylip barb embryo and larvae is 60 ppm.

Keywords : embryo and larvae, bonylip barb, potassium dichromate, digestive organ