PENGARUH PAPARAN AIR LINDI TERHADAP PARAMETER FERTILITAS DAN REPRODUKSI MENCIT BETINA (*Mus musculus*)

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ABSTRAK

Air lindi merupakan hasil dekomposisi sampah di tempat pembuangan akhir (TPA) yang mengandung senyawa organik, anorganik, dan logam berat yang bersifat toksik dan berpotensi mengganggu sistem reproduksi. Penelitian ini bertujuan menganalisis pengaruh paparan air lindi terhadap parameter reproduksi mencit betina meliputi bobot badan, siklus estrus, indeks ovarium, indeks uterus, dan histologi ovarium, serta mengidentifikasi karakteristik kimia air lindi. Penelitian menggunakan rancangan eksperimental dengan lima kelompok perlakuan: kontrol negatif aquades (K-), kontrol positif intervensi kafein (K+), dan air lindi konsentrasi 30% (P1), 50% (P2), dan 70% (P3) pada mencit betina usia ± 8 minggu yang diberikan selama 28 hari. Karakteristik air lindi diidentifikasi menggunakan *Fourier Transform Infrared* (FTIR), siklus estrus diamati melalui apusan vagina, parameter reproduksi dianalisis secara histopatologi dan statistik. Hasil FTIR didapati dominasi gugus polimer plastik seperti PE, PP, dan PS, serta asam humat, fenol, dan senyawa aromatik dalam air lindi. Paparan air lindi menyebabkan penurunan bobot badan pada kelompok P2 (−2,2 g) dan kelompok P3 (−1,8 g), mengindikasikan toksisitas sistemik. Paparan lindi berpengaruh signifikan terhadap perpanjangan fase diestrus dan siklus estrus pada kelompok P2 dan P3 ($p < 0,05$), namun tidak signifikan pada fase metestrus. Indeks ovarium ($p = 0,096$) dan indeks uterus ($p = 0,068$) tidak berbeda signifikan antar kelompok, meskipun terdapat kecenderungan penurunan pada P2 dan P3. Histopatologi ovarium menunjukkan peningkatan jumlah folikel atretik, hambatan maturasi folikel (*follicular arrest*), serta penurunan jumlah korpus luteum, terutama pada kelompok P2 dan P3, yang mengindikasikan terjadinya gangguan folikulogenesis dan ovulasi. Berdasarkan penelitian ini menunjukkan bahwa air lindi berpotensi memiliki aktivitas EDCs yang menunjukkan gangguan pada siklus estrus, pola penurunan berat organ, dan jumlah peningkatan folikel atretik pada kelompok perlakuan dengan paparan lindi konsentrasi menengah (50%) dan tinggi (70%).

Kata kunci: air lindi, EDCs, FTIR, siklus estrus, histopatologi ovarium, toksisitas reproduksi.

THE EFFECT OF LEACHATE WATER EXPOSURE ON FERTILITY AND REPRODUCTION PARAMETERS OF FEMALE MICE (*Mus musculus*)

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ABSTRACT

Landfill leachate is a byproduct of solid waste decomposition in landfills that contains toxic organic compounds, inorganic compounds, and heavy metals, which have the potential to disrupt the reproductive system. This study aimed to analyze the effects of landfill leachate exposure on reproductive parameters in female mice, including body weight, estrous cycle, ovarian index, uterine index, and ovarian histology, as well as to characterize the chemical composition of the leachate. An experimental design was employed using five treatment groups: a negative control (distilled water; K−), a positive control (caffeine intervention; K+), and landfill leachate at concentrations of 30% (P1), 50% (P2), and 70% (P3). Female mice aged approximately 8 weeks were orally exposed for 28 days. Leachate characteristics were identified using Fourier Transform Infrared (FTIR) spectroscopy, the estrous cycle was monitored through vaginal smear cytology, and reproductive parameters were evaluated using histopathological and statistical analyses. FTIR analysis revealed the predominance of plastic polymer groups such as polyethylene (PE), polypropylene (PP), and polystyrene (PS), as well as humic acids, phenolic compounds, and aromatic compounds in the leachate. Leachate exposure resulted in body weight loss in the P2 (−2.2 g) and P3 (−1.8 g) groups, indicating systemic toxicity. Leachate exposure significantly prolonged the diestrus phase and the estrous cycle in the P2 and P3 groups ($p < 0.05$), whereas no significant effect was observed during the metestrus phase. The ovarian index ($p = 0.096$) and uterine index ($p = 0.068$) did not differ significantly among the groups, although both parameters showed a decreasing trend in the P2 and P3 groups. Ovarian histopathology demonstrated an increased number of atretic follicles, impaired follicular maturation (follicular arrest), and a reduced number of corpora lutea, particularly in the P2 and P3 groups, indicating disrupted folliculogenesis and ovulation. These findings suggest that leachate exhibits potential EDCs activity, evidenced by disruptions to the estrous cycle, patterns of organ weight reduction, and an increased number of atretic follicles in treatment groups exposed to medium (50%) and high (70%) leacheat concentrations.

Keywords: *leachate, EDCs, FTIR, estrous cycle, ovarian histopathology, reproductive toxicity.*