

Analisis Pengaruh Intervensi Hidrasi terhadap Dampak Tekanan Panas dan Risiko Gangguan Fungsi Ginjal: Pilot Studi pada Pekerja Konstruksi di Proyek Pembangunan Gedung X Tangerang Selatan

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Abstrak

<div style="text-align: justify;">Gangguan fungsi ginjal akibat tekanan panas (heat stress) merupakan risiko signifikan bagi pekerja konstruksi yang terpajan panas ekstrem. Pilot studi kuasi eksperimental ini bertujuan untuk menganalisis pengaruh intervensi hidrasi pada dampak tekanan panas dan risiko gangguan fungsi ginjal pada pekerja konstruksi. Pengambilan sampel purposive dilakukan untuk mengukur faktor risiko (lingkungan, pekerjaan, individu), dampak tekanan panas dan biomarker fungsi ginjal (SCr, LFG, BUN) pada tahap pra dan pascaintervensi. 46 responden terbagi dalam 4 kelompok, yaitu Kontrol, Intervensi 1 (intervensi rehidrasi), Intervensi 2 (intervensi prehidrasi dan rehidrasi), dan Intervensi 3 (intervensi rehidrasi dan elektrolit). Analisis data dilakukan dengan paired t-test, MANOVA, Difference in Differences, dan GLM Repeated Measure. Temuan utama menunjukkan intervensi hidrasi berdampak positif dan konsisten meningkatkan fungsi ginjal, ditunjukkan melalui penurunan kadar SCr dan BUN serta peningkatan LFG (Pillai's Trace=0,528, F=2.98, p-value=0.003). Efek intervensi menunjukkan 31% perubahan kadar SCr dan LFG, serta 30% perubahan BUN dipengaruhi oleh perbedaan intervensi pada setiap kelompok. Terdapat perbedaan signifikan perubahan tekanan sistolik pagi – siang di antara kelompok intervensi pada kombinasi indikator tekanan panas (Pillai's Trace=1.055, F=1.677, p-value = 0.026), 27% perubahannya dipengaruhi oleh perbedaan intervensi pada setiap kelompok. Dampak intervensi hidrasi pada perbaikan fungsi ginjal dan tekanan panas terlihat lebih kuat dan bermanfaat pada Kelompok Intervensi 2 dan 3. Selain itu, usia memiliki hubungan yang signifikan dengan fungsi ginjal (Pillai's Trace=0,724; F=20,139; p-value<0,001), kebiasaan berolahraga berinteraksi dengan fungsi ginjal dari praintervensi dan pascaintervensi (Pillai's Trace=0,458; F=2,376; p-value=0,043). Perlu mengembangkan regulasi dan pedoman teknis intervensi hidrasi pada sektor konstruksi, pemantauan rutin pajanan panas dan dampaknya, perlunya skrining fungsi ginjal pada pekerja lanjut usia, pentingnya aktivitas fisik dan kebiasaan hidup sehat di luar jam kerja sebagai bagian dari upaya pencegahan gangguan fungsi ginjal, serta perlu melakukan studi lanjutan dengan besar sampel yang lebih banyak.</div><hr /><div style="text-align: justify;">Kidney dysfunction due to heat stress is a significant risk for construction workers exposed to extremely hot working environments. This quasi-experimental pilot study aimed to analyze the effect of hydration intervention on the impact of heat stress and the risk of kidney dysfunction in construction workers. Purposive sampling was conducted to measure risk factors (environmental, occupational, individual), the impact of heat stress, and biomarkers of kidney function (SCr, GFR, BUN) at the pre- and post-intervention stages. Forty-six respondents were divided into four groups: Control, Intervention 1 (rehydration intervention), Intervention 2 (prehydration and rehydration intervention), and Intervention 3 (rehydration and electrolyte intervention). Data analysis was performed using paired t-test, MANOVA, Difference in Differences, and GLM Repeated Measure. The main findings showed that the hydration intervention had a positive and consistent impact on improving kidney function, indicated by decreased SCr and BUN levels and increased GFR (Pillai's Trace=0.528, F=2.98, p-value=0.003). The intervention effect

showed a 31% change in SCr and LFG levels, and a 30% change in BUN influenced by the difference in intervention in each group. There was a significant difference in changes in morning - afternoon systolic pressure between the intervention groups on the combination of heat stress indicators (Pillai's Trace = 1.055, $F = 1.677$, $p\text{-value} = 0.026$), 27% of the change was influenced by the difference in intervention in each group. The impact of hydration intervention on improving kidney function and heat stress appeared stronger and more beneficial in Intervention Groups 2 and 3. In addition, age had a significant relationship with kidney function (Pillai's Trace = 0.724; $F = 20.139$; $p\text{-value} < 0.001$), exercise habits interacted with kidney function from pre-intervention and post-intervention (Pillai's Trace = 0.458; $F = 2.376$; $p\text{-value} = 0.043$). There is a need to develop regulations and technical guidelines for hydration interventions in the construction sector, routine monitoring of heat exposure and its impacts, the need for kidney function screening in elderly workers, the importance of physical activity and healthy lifestyle habits outside of work hours as part of efforts to prevent kidney function disorders, and the need to conduct further studies with a larger sample size.