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LOW GLOMERULAR FILTRATION RATE IS ASSOCIATED WITH HEMORRHAGIC TRANSFORMATION IN ACUTE ISCHEMIC STROKE PATIENTS: A META-ANALYSIS

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Objectives: Acute Ischemic Stroke (AIS) is one of the leading cause of death, premature death, and disability globally. Hemorrhagic transformation (HT) is a common complication of AIS and is related to higher mortality, early neurological deterioration, and worse long-term functional outcome. Numerous observational studies have been published but the relationship between low eGFR level and HT in AIS patients is still controversial. We sought to do a meta-analysis to determine the association between low eGFR level and HT in AIS.

Methods: We searched multiple electronic databases to identify studies published from 1990 to 2018. Following the application of inclusion and exclusion criteria, the ORs and 95% CIs of all the included studies were employed to estimate the pooled OR and 95% CI using the inverse variance random-effects method. Publication bias was assessed through Egger's test and Begg test. Heterogeneity was assessed by means of the I-squared value.

Results: Ten observational studies including 4,653 AIS patients contributed to the analysis. Low eGFR level significantly increased the risk of HT in AIS patients (OR=1.60, 95% CI: 1.21–2.1, P = 0.001). Significant heterogeneity was seen among studies (I^2 = 45%, p = 0.06). No evidence of publication bias was observed in this meta-analysis. The effect size was stable during sensitivity analysis. We found no subgroup difference based on study design, study population, AIS type, stroke treatment, and study site.

Conclusions: Our study showed that low eGFR increases the risk of HT. Our study had significant heterogeneity, as a consequence, the results of our meta-analysis should be interpreted with caution. Clinicians managing AIS patients should pay attention to renal insufficiency for preventing HT after AIS. In-depth laboratory studies are warranted to find out the mechanisms that could explain the association between renal insufficiency and HT.

Forest Plot

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Agrawal 2009	0.686	0.768	3.0%	1.99 [0.44, 8.95]
Balian 2017	0.599	0.203	16.5%	1.82 [1.22, 2.71]
Hsieh 2014	0.03	0.319	11.0%	1.03 [0.55, 1.93]
Lee 2013	1.065	0.426	7.6%	2.90 [1.26, 6.69]
Liu 2018	1.308	0.534	5.4%	3.70 [1.30, 10.53]
March 2013	0.779	0.386	8.7%	2.18 [1.02, 4.64]
Micozkadioglu 2013	0.01	0.383	8.8%	1.01 [0.48, 2.14]
Naganuma 2011	0.971	0.456	6.9%	2.64 [1.08, 6.45]
Tutuncu 2013	0.445	0.164	18.8%	1.56 [1.13, 2.15]
Zhang 2013	-0.19	0.262	13.4%	0.83 [0.49, 1.38]
Total (95% CI)			**100.0%**	**1.60 [1.21, 2.10]**

Heterogeneity: $Tau^2 = 0.08$; $Chi^2 = 16.33$, df = 9 (P = 0.06); $I^2 = 45\%$
Test for overall effect: Z = 3.33 (P = 0.0009)