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### Effect of dimethyl sulfoxide on injuries and neurological deficits: a rat model of transient focal cerebral ischemia

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#### Abstract:

**Background:** Dimethyl sulfoxide (DMSO) has been used as a solvent for many drugs in ischemic experiments. DMSO has many biological benefits, including antioxidant, anti-inflammatory, platelet aggregation inhibiting and cell membrane stabilizing effects. Moreover, some experimental studies report that DMSO has a neuroprotective effect in permanent focal cerebral ischemia. Despite the effect of DMSO on the cortex, striatum injuries and motor neurological dysfunctions in transient focal cerebral ischemia are not completely clear.

**Methods:** Thirty-six male Sprague-Dawley rats weighing 300-350 g were divided into saline- (control) and DMSO-treated groups. Under chloral hydrate anesthesia (400mg/kg, ip), transient focal cerebral ischemia was induced by 90-min middle cerebral artery occlusion (MCAO) followed by 23-h reperfusion. Rats received saline (n=11) or 2% DMSO intraperitoneally at doses of 0.01 (n=11), 0.1 (n=7) and 0.2 (n=7) ml/kg 30 min prior to induction of ischemia. Twenty-four hours after MCAO, the neurological deficit scores were ascertained. Cortical and striatal infarct volumes determined by triphenyltetrazolium chloride staining.

**Results:** Administration of DMSO at doses of 0.1 and 0.2 ml/kg significantly reduced cortical and striatal infarct volumes ( $p < 0.001$ ), while rats receiving the 0.1 ml/kg dose had infarct volumes similar to those of the control group ( $p = 0.225$ ). Moreover, only 0.2 ml/kg doses of DMSO significantly reduce neurological motor dysfunction ( $p < 0.001$ ).

**Conclusions:** Findings of this study indicate that DMSO is a potent neuroprotective agent against transient focal cerebral ischemia in rat. Moreover, our data also suggest that DMSO may be a candidate for acute stroke treatment.

#### Keywords:

Dimethyl sulfoxide . cerebral . ischemia . transient . focal . rat

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