Neuropsychiatric Disease and Treatment

Dovepress

open access to scientific and medical research

Open Access Full Text Article

LETTER

4-Hydroxysesamin, a Modified Natural Compound, Attenuates Neuronal Apoptosis After Ischemic Stroke via Inhibiting MAPK Pathway [Letter]

Agriani Dini Pasiana*, Hasta Handayani Idrus*

Center for Biomedical Research, Research Organization for Health, National Research and Innovation Agency (BRIN), Cibinong Science Center, Bogor, West Java, Indonesia

*These authors contributed equally to this work

Correspondence: Agriani Dini Pasiana, Center for Biomedical Research, Research Organization for Health, National Research and Innovation Agency (BRIN), Cibinong Science Center, Bogor, West Java, Indonesia, Email agrianipasiana@yahoo.com

Dear editor

Congratulations to Wang et al who have published a paper entitled 4-Hydroxysesamin, a Modified Natural Compound, Attenuates Neuronal Apoptosis After Ischemic Stroke via Inhibiting the MAPK Pathway.[1] This experiment is the first study to provide information regarding clinical studies of the substance 4-Hydroxysesamine. 4-hydroxysesamin (4-HS, lignin di-tetrahydrofuran) is a modified sesamin known for its effect as anti-oxidant, anti-inflammatory, and neuroprotective properties.[2,3] Ischemic stroke can cause severe nerve injury, and is one of the leading causes of death and disability worldwide, so this research is important for finding other agents that can be used for the treatment of neurodegenerative diseases.[1]

Research conducted by Wang et al showed that 4-hydroxysesamin has anti-inflammatory effects similar to sesamin but does not affect the viability of HT22 cells. The 4-hydroxysesamine can increase cell viability, ameliorated neuronal apoptosis, along with reversion the expression of apoptotic proteins (Bax, cleaved-caspase 3/9, Bcl-2) and inflammatory cytokines (IL-6, TNF-α, IL-10) in lipopolysaccharide (LPS)-treated HT22 cells in vitro. They also found 4-hydroxysesamin could decrease the phosphorylation of ERK, JNK, and p38 but the addition of MET could reverse 4-hydroxysesamin-induced changes of phenotype and protein expression in LPS-treated cells. Moreover, 4-hydroxysesamine showed development in cerebral infarction, brain tissue morphology, neuronal architecture, apoptosis, and inflammation of MCAO mice, in vivo. In addition, 4-hydroxysesamine also showed inhibiting effects on the phosphorylation of ERK, JNK, and p38.[1] Considering the inflammatory component in stroke pathology is very large, so it is important to pay attention to differences in immune biology between species. Several important immune signalling molecules (IL-8, CXCL7, CCL18, MCP-4 and CCL24/CCL26) are expressed in humans but not mice, while CCL6, CCL9, and MCP-5 are present in mice but not humans. Therefore, the possibility of therapeutic targets being present in humans, but not rodents, or vice versa, should not be overlooked.[4] In addition, the middle cerebral artery occlusion (MCAO) model in murine models is most widely used for in vivo studies because it is very similar to stroke in humans >80%. The middle cerebral artery occlusion (MCAO) produces regenerative occlusion of the middle cerebral artery, and also allows reperfusion without resection of the extracranial occlusion. The mechanism of rapid blood flow restoration is different from the pathophysiology of stroke in humans. However, this model can still simulate the clinical application of mechanical thrombolysis, thus the middle cerebral artery occlusion (MCAO) may be applied more widely in patients in the future.[5]

In summary, we agree that 4-hydroxysesamine suppresses neuronal apoptosis and inflammation by inhibiting the p38 MAPK pathway in the cell and the middle cerebral artery occlusion (MCAO) model, suggesting that 4-hydroxysesamine might be a potential therapeutic lignan for ischemic stroke or a dietary strategy to prevent disease progression.[1] Considering this experiment is the first pre-clinical study on 4-hydroxysesamine, in-depth research needs to be carried out to explore the potential of 4-hydroxysesamine for clinical application.

Received: 14 March 2024
Accepted: 27 March 2024
Published: 3 April 2024

Disclosure

The authors report no conflicts of interest in this communication.

References

1. Wang L, Qu Z, Sun Q, Mao Z, Si P, Wang W. 4-hydroxysesamin, a modified natural compound, attenuates neuronal apoptosis after ischemic stroke via inhibiting MAPK pathway. *Neuropsy Dis Treat*. 2024;20:523–533 doi:10.2147/NDT.S444760.
2. Dalibalta S, Majdalawieh AF, Manjikian H. Health benefits of sesamin on cardiovascular disease and its associated risk factors. *Saudi Pharm J*. 2020;28(10):1276–1289. doi:10.1016/j.jsps.2020.08.018
3. Rosalina R, Weerapreeyakul N. An insight into sesamolin: physicochemical properties, pharmacological activities, and future research prospects. *Molecules*. 2021;26(19):5849. doi:10.3390/molecules26195849
4. Holloway PM, Gavins FN. Modeling ischemic stroke in vitro: status quo and future perspectives. *Stroke*. 2016;47(2):561–569. doi:10.1161/STROKEAHA.115.011932
5. Zhao Y, Zhang X, Chen X, Wei Y. Neuronal injuries in cerebral infarction and ischemic stroke: from mechanisms to treatment (Review). *Int J Mol Med*. 2022;49(2):15. doi:10.3892/ijmm.2021.5070

https://doi.org/10.2147/NDT.S468941