



Figure 6: (a-c) Western blot analyses of apoptotic proteins in cerebral ischemic reperfusion injury and propionic acid treatment in experimental mice. Data were presented as mean \pm standard deviation. A $P \leq 0.05$ was considered statistically significant. Comparisons: *-with Sham; #-with cerebral ischemic reperfusion

to reduce the levels of inflammatory cytokines in inflammatory bowel diseases^[47] and the levels of NOS and TNF- α activities.^[48] It could be due to the protective effect of bacterial digested and released fatty acids that circulate to the brain cells that include PA.^[18] These were consistent with the data obtained in the present study, in which supplemented PA could have beneficial effects in decreasing the levels of inflammatory cytokines. Administration of PA after CIR injury attenuated the elevated levels of inflammatory cytokines and controlled the cerebral impairments.

NfκB, caspase-3, and caspase-9 are the major important proteins involved in the inflammatory processes. Of those, NfκB has been reported to involve in the inflammatory processes by its translocation into the nucleus after phosphorylation.^[49] In line with this report, our study showed an elevated level of pNfκB to NfκB during CIR inflammation and was reverted during treatment with PA. Concomitantly, this could have decreased the expression levels of inflammatory cytokines, leading to beneficial effects in PA treatment. Furthermore, we showed that PA inhibited the activation of NF-κB pathway, mediated by TNF- α , which benefits to treat the CIR injury. Inflammatory signaling network involves Rho-kinase (RhoK), and NfκB-mediated caspase activation leading to apoptosis in the injured tissues.^[50] In line with these research, our study demonstrated decreased level of caspases (3 and 9) that were elevated during CIR injury.

CONCLUSION

Overall the findings reflect the healthier effect of PA toward brain cells. Furthermore, as seen together, decreased apoptotic protein levels augmented the control of cytokines level during PA administration, in the inflammatory processes in CIR injury. In summary, we found that PA treatment exhibited a healthier effect in CIR injury by interacting with RhoK/NfκB pathways signaling in brain hippocampus of mice.

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Conflicts of interest

There are no conflicts of interest.

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