Guarana inhibits protein glycation, AGE induced toxicity and prevent amyloid β aggregation in neuron like cells

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INTRODUCTION: Advanced glycation end products (AGEs) have been considered as potent molecules promoting neuronal cell death and contributing to neurodegenerative disorders such as Alzheimer’s disease (AD). A number of AGEs-related crosslinks, are detected in senile plaques. Several studies showed that AGEs exacerbate amyloid β aggregation. Polyphenols contained in several plants have inhibitory effects in amyloid β peptide aggregation and act as AGEs scavengers. In the present study we observed the inhibitory effects of guarana (Paullinia cupana) in protein glycation, AGEs toxicity and amyloid β aggregation, cellular events involved in pathogenesis of Alzheimer Disease.

MATERIAL AND METHODS: Guarana concentrations used in this study was 10µg/mL, 100 µg/mL and 1000 µg/mL. The in vitro protein glycation was performed using Bovine Serum Albumine (BSA), Glucose and Fructose and AGEs (Methylglyoxal and Glyoxal) during 7 days. We evaluated AGEs toxicity by MTT assay. The amyloid β aggregation was performed by Thioflavin T (ThT) assay. The statistical analysis used for data evaluation was ONE-WAY ANOVA followed by Tukey’s post hoc test.

RESULTS AND DISCUSSION: Regarding protein glycation, guarana inhibited glycation by sugars in all concentrations (10, 100 and 1000 µg/mL) respectively (70,5, 73,7% and 89% inhibition). Guarana was also effective in inhibiting protein glycation by Methylglyoxal (38,2, 43 and 55% inhibition respectively) and Glyoxal (62,8, 74,0 and 82%). After we evaluated the effects of guarana against AGEs induced cytotoxicity in SHSY5Y neuron like cells. Guarana was effective in the highest concentration (101% viability for Methylglyoxal and 71,5% for Glyoxal). Guarana also inhibited the aggregation of amyloid β peptide in dose dependent manner, 12, 29 and 77% inhibition rate for 10, 100 and 1000µg/mL respectively ($r^2=0,95$). CONCLUSION: Our results suggest that guarana extract may be considered as a promising alternative in the prevention of Alzheimer disease, but much more studies are need to reinforce this finding.

Key Words: guarana, polyphenols, Alzheimer, AGEs, amyloid β

Founding: FAPERGS, CNPq and CAPES