EVALUATING THE LEVELS OF OXIDATIVE DNA DAMAGE IN HUMAN LYMPHOCYTES IN RESPONSE TO CAFFEINE USING COMET ASSAY (SINGLE CELL GEL ELECTROPHORESIS)

ABSTRACT

Objectives: Caffeine asin (coffee, cola, and tea) is the most widely consumed beverages worldwide. The current study aims to evaluate the effects of caffeine in different concentrations on human cultured peripheral lymphocytes, in healthy individuals, using comet assay. The extent of DNA damage reflects a balance between oxidative stress (the presence of hydrogen peroxide H2O2 as a reactive oxygen species ROS), and DNA repair ability (the presence of anti-oxidant may be caffeine substances at known concentrations). This is an important method to prevent and avoid many cancerous diseases in an era of various pollutants.

Methods: Ten milliliters of venous blood samples were collected from 40 healthy young individuals, and lymphocyte cultures were set up after lymphocyte isolation with ficoll centrifugation. The mixture of lymphocytes culture media was incubated in the sterile incubator for 5 min after adding serial concentrations of caffeine (100, 500, 5000, 10000) µg/ml, as(group1,2,3,4 respectively) to 5% H2O2. The levels of oxidative DNA damage were expressed as comet tail length.

Results: At concentration 100 ug/ml, there was a significant elevation in the mean comet tail length level in cultured lymphocytes treated with hydrogen peroxide (106.96 µm) compared with the treated with All (mixture of caffeine, and H2O2), 6.670 µm.

Conclusion: We've concluded that a caffeine concentration of 100 µg/ml possesses the strongest anti-oxidant properties and causes much less DNA damage in lymphocytic culture when exposed to hydrogen peroxide.

Keywords: Oxidative DNA damage, Comet assay, Lymphocyte, Hydrogen peroxide

ملخص عربي

تقييم مستوى ضرر الDNA التأكسدي للخلايا اللمفية البشرية المستزرعة بوجود الكافئين وباستخدام تقنية الترحيل الكهربي الهلامي لأحادي الخلية

ان الكافئين(القهوة ، الشاي ، الكولا) من المشروبات الأكثر تناولاً في العالم ، والهدف من الدراسة هو تقييم تأثير الكافئين وبمختلف التراكيز على الخلايا اللمفية البشرية المستزرعة للأشخاص الأصحاء باستخدام تقنية الترحيل الكهربي الهلامي لأحادي الخلية ، كمية الDNA المتضررة تعكس التوازن بين تأثير التأكسدي (بوجود بيروكسيد الهيروجين H2O2كوحدة أوكسجين فعال ROS وبين الاصلاح للDNA (بوجود مواد مضادة للأكسدة مثل الكافئين وعند تراكيز معلومة) وبهذه الطريقة المهمة كثيراً لتفادي العديد من الأمراض المسرطنة في العالم ككل .