

## **ANTIMUTAGENIC EFFECT OF CHINESE CABBAGE ( *Brassicarapa L cv. Caisin Group* ) EXTRACT ON CHROMOSOMAL ABERRATION IN MICE**

SUPARTINISYARIF<sup>1</sup>, ARIFIN S DWIPAIRSYAM<sup>2</sup>, , SRI RAHAYU REJEKININGSIH<sup>3</sup>

<sup>1,2,3</sup>Department of Biology Faculty of Mathematics and Natural Sciences,  
Universitas Padjadjaran  
Jl. Raya Bandung Sumedang km-21 Jatinangor, Sumedang  
e-mail : supartini\_syarif@yahoo.co.id

### **ABSTRACT**

This study was conducted to evaluate the antimutagenic potential of chinese cabbage ( *Brassicarapa L. cv Caisin Group* ) extract against chromosomal aberration produced by mutagen ( lead acetate ) in mice. Chromosomal analysis was carried out in bone marrow cells following administration of five doses of chinese cabbage extract ( 2mg/kg bw; 5 mg/kg bw; 16 mg/kg bw; 49 mg/kg bw; and 156 mg/kg bw). The extract were given in the days of 1, 3, 5, 7, 9, 11, and 13. The single dose of mutagen (3025 mg/kg bw) was given in the days of 5, 9, and 13. The result indicated that chromosomal aberration were significantly reduced ( $P < 0.05$ ) by plant extract treatment. The study revealed that chinese cabbage extract decreased the number of chromosomal aberration in a dose dependent manner. The types of chromosomal aberration observed included: gap chromosome, ring chromosome, fragment, tiradial, stickiness, lost fragment, micronuclei, and numeric aberration.

**Key words** : chromosomal aberration, chinese cabbage extract, lead acetate, bone marrow, mice

### **INTRODUCTION**

Heavy metals like Cd, Cu, Fe, Hg and Pb contribute significantly environmental pollution. Among the heavy metals, the use of lead in industrial caused widespread environmental contamination. Lead induced genotoxicity, mutagenicity and carcinogenic. The mutagenic and carcinogenic potentials of lead are still being investigated. In recent years, there is increasing awareness that certain naturally occurring substance in plants provide protection against environmental mutagens or carcinogen. The *Brassicaceae*(*Cruciferae*) family has chemopreventive potential, particularly due to their content in glucosinolate are hydrolyzed by specific thioglucosidases called myrosinases to produces isothiocyanates, nitriles, and

thiocyanates with different biological activity. Some isothiocyanate, such as sulphoraphane has been found to possess anticarcinogenic effect. Extracts of the different species of the *Brassicaceae* family show antioxidant effect. This study was conducted to evaluate the antimutagenic potential of chinese cabbage (*Brassicarapa* L. cv Caisin Group) extracts against chromosomal aberration produced by mutagen (lead acetate) in mice.

## **MATERIALS AND METHODS**

### **Extract preparation**

The chinese cabbage leaves were cutting and ethanol extract was prepared by extraction of leaves in 95% ethanol in a soxhlet apparatus for 72 h. The liquid extract was then cooled and concentrated by evaporation at 40°C.

### **Treatment Procedure**

Twenty four (6-8 weeks old) mice weighing 18-20 gram were housed without food for 24 h before treatment. Animal (mice) were treated orally with 5 doses of cabbage extract (2 mg/kg bw; 5mg/kg bw; 16mg/kg bw; 49 mg/kg bw; and 156 mg/kg bw) in days of 1, 3, 5, 7, 9, 11, and 13 consecutive prior to the treatment of single dose of mutagen (lead acetate). The single dose of lead acetate (3025 mg/kg bw) was given orally in the days of 5, 9, and 13 consecutive. Control group were treated with lead acetate without extract. The animal were sacrifice 6 h after the last treatment.

### **Chromosomal Aberration analysis**

Mice were injected with 0.01ml/gr bw colchicines (0.05%) intraperitoneally. After 30 minutes the animals were sacrifice by cervical dislocation. Femurs were removed and bone marrow flushed out with hypotonic solution (KCl 0.56%) and incubated 30 minutes at 37°C temperature. The cell suspension centrifuged for 10 minutes. Cell pellets was fixed in Carnoy's fixative (methanol/acetic glacial 3:1) for 20 minutes then shake gently with Pasteur's pipette for 10 minutes. The cell suspension washed thrice by centrifugation and resuspended in fixative solution and the final suspension was prepared in 2 ml of fixative solution. The cells were dropped on slides, dried, stained with 2.5% Giemsa for 14 minutes, washed in tap water and air dried.

### Statistical analysis

The significance of difference between the data in control and in experimental groups was analyzed with ANOVA and continued with Duncan Multiple Range test.

### RESULT AND DISCUSSION

Tabel. Duncan multiple range test :Antimutagenic effect of Chinese cabbage (*Brassicarapa* L cv. Caisin Group ) Extract On Chromosomal Aberration In Mice .

Treatment	Percentage of chromosomal aberration (%)
Control	82.5 <sup>c</sup>
1	80 <sup>c</sup>
2	78.25 <sup>c</sup>
3	61.25 <sup>b</sup>
4	59.50 <sup>b</sup>
5	34.00 <sup>a</sup>

Letters in superscript designate significant differences among the groups at the level of significance of  $P < 0.05$

<sup>c</sup>statistically not significant in comparison with control

<sup>b, c</sup> statistically significant in comparison with control

The result revealed that Chinese cabbage extract significant decrease of chromosomal aberration in mice bone marrow due to lead acetate ( $P < 0.05$ ). The effect of plant extract on decrease of chromosomal aberration was dose dependent. Lead induced oxidative stress generation of reactive oxygen species (ROS) and could DNA damage.

The *Brassicaceae* family has anticarcinogenic, antimutagenic, antioxidant and decrease oxidative damage. Antimutagenic and anticarcinogenic properties have been associated with products of glucosinolate, isothiocyanate, and indole. The result indicated that Chinese cabbage (*Brassicaceae*) have antimutagenic and antioxidant effect.

The analysis of chromosomal aberration detected were: ring chromosome, lost fragment, gap chromosome, fragment, micronucleus, triradial chromosome and stickiness.

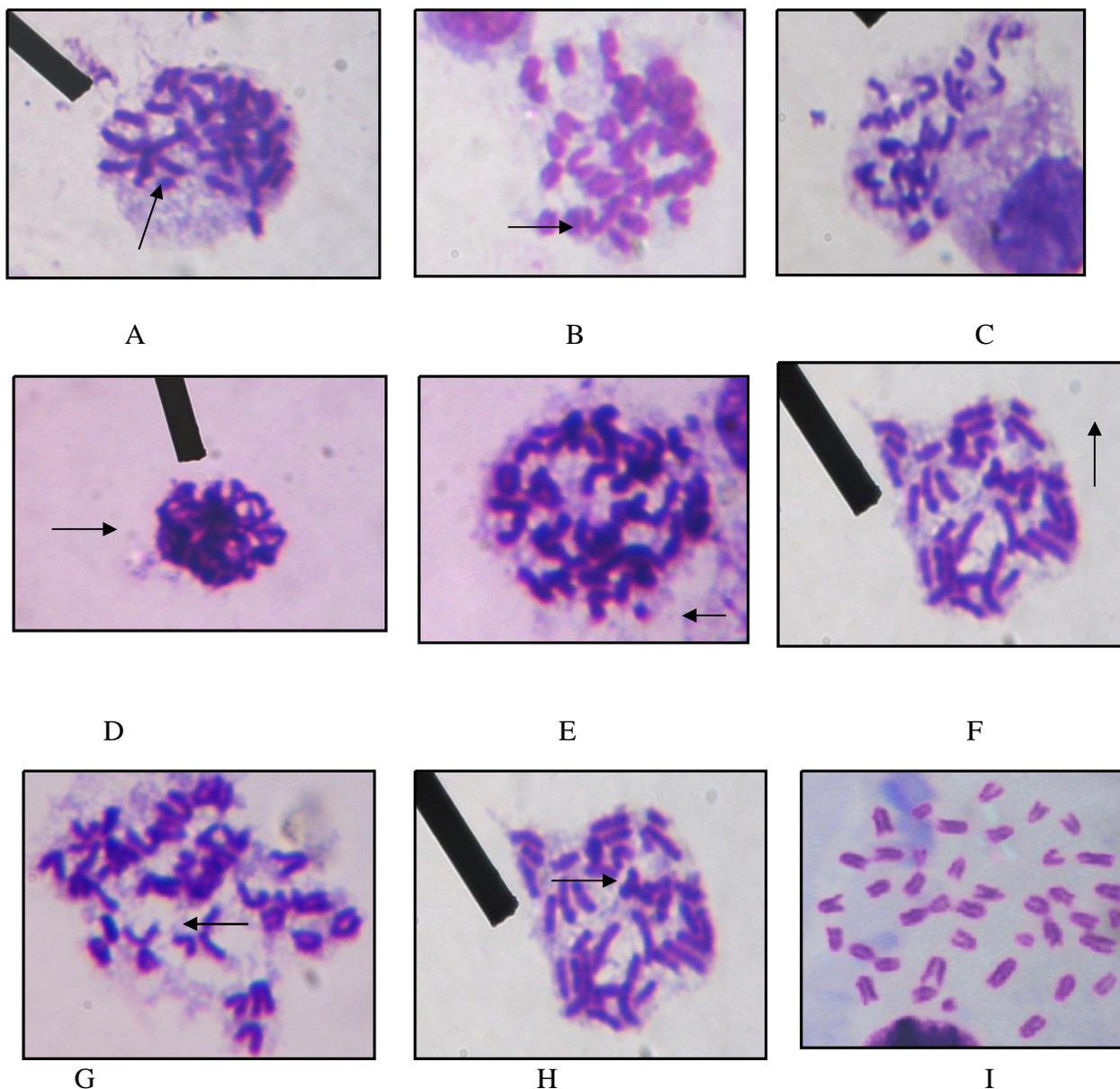


Figure : A Fragment; B Ring chromosome; C numeric aberration ; D Stickiness ; E Micronucleus F Lost fragment ; G Gap chromosome ; H Triradial chromosome ; I Normal chromosome.

## REFERENCE

- Acharya, U.R.; Acharya,S; & Mishra, M.2003. Lead Acetate Induced Cytotoxicity In Male Germinal Cells of Swiss Mice. *Industrial Health*.41 : 291-294
- Adesida, A., L.G Edwards, & P.J. Thornalley. 1996. Inhibition of Human Leukaemia 60Cell Growth by  $\beta$ -[N-Phenylethylthiocarbamoyl]cysteine. *Food Chem.Toxicol*.34 : 385-392.

- Arif,M; Y. Kabir; F.Hassan;T.M. ZavedWaise;E.H.Mazumder; S.Rahman.2008.  
Increased DNA damage in blood cells of rat treated with lead as assessed by comet assay. *Bangladesh J Pharmacol* 3:97-101
- Bish, K.S. & Devi, P.U. 1994. Dose dependent Increase in The Frequency of Micronuclei and Chromosomal Aberration by Misonidazole in Mouse Bone Marrow. *Mutation Research*. 425:57-63
- Chen,S.and B.A. Halkier.200. Characterization on Clucosinolate Uptake by Leaf Protoplas of Brassica napus. *The Journal of Biological Chemistry* 275(30): 22955-22960
- Fimognari,C. And P.Hrelia 2006. Sulforaphane as a promising molekule for fighting Cancer. [http://www.Scientiesdirect.com/science?\\_ob=MIimg](http://www.Scientiesdirect.com/science?_ob=MIimg)
- Jongen,W.M.F. 1996. Glucosinolates in Brassica: Occurrence and Significance as Cancer-modulating agents.*Proceeding of the Nutrition Society* (55);433-446
- Jahangir, M; H.K. Kim; Y.H. Cbi and R. Verpoorte. 2009. Heth- Affecting Compounds in Brassicaceae. *Comprehensive Reviews In Food Science And Food Safety*.
- Kasuba,V,R. Rosgaj,AFucic,V.MVarnaidan M Piasek.2004. Lead Acetate genotoxicity in suckling rats. *Biologia*, Bratislava. 5916:779-785.
- Miyazawa,M ; T. Nishiguchi and C. Yamafuji 2003. Volatile components of leaves of Brassicarapa L .var.pervidis Bailey. *Flavourang Fragrance Journal* (20):158-160