

Inhibitory Effect of Bombay Onion (*Allium cepa* L.) Extracts on Mitotic Chromosomes

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Abstract

Cancer is one of the world health problems. Free radical could damage cells and lead to cancer. Antioxidant compound could be found in some vegetable such as phenols and flavonoids. Flavonoids and phenol significantly decrease micronucleus formation on mitotic chromosomes. This present study aim to explore the inhibitory effect of Bombay onion extracts (BOE) on mitotic chromosomes induced by cyclophosphamide. Twenty-five mice (body weight 20–35 g) were divided into 5 groups, with 5 mice in each group. Normal control group (NCG) were given CMC 5 mg/mice/7 days. Mutagen control group (MCG) that is previously given as NCG, 4 hours later were given cyclophosphamide at a dose of 50.0 mg/kg bw intraperitoneally. Three treatment groups, group I (TG-1), TG-2, and TG-3, were given BOE with doses of 100; 200; and 400 mg/kg bw for 7 days, respectively. After 7 days, all three groups were treated similarly with MCG. Thirty hours later, all groups were put to death and femur bone marrows were analyzed to count the number of micronucleus. The results showed that the number of micronucleus in every 200 polychromatic erythrocyte cells at mitotic chromosomes for NCG is 29.8 ± 2.387 , MCG with a value of 120.8 ± 5.718 , TG-1 showed 94.8 ± 7.049 , TG-2 is 68.8 ± 3.421 , and TG-3 which is 30.8 ± 0.837 . TG-3 showed a similar result with NCG ($p > 0.05$).

Keywords : mitotic chromosomes, Bombay Onion Extracts, femur bone marrow, micronucleus

INTRODUCTION

Antioxidants are substances or natural compounds that can protect cells from damage and aging due to reactive molecules and free radicals. Free radicals could disrupt the immune system, triggered degenerative diseases such as cancer, diabetes mellitus, coronary heart disease and immunodeficiency disorder. Antioxidants could neutralize free radicals leading to reduce cells damage. Antioxidant could scavenge free radical, and reduced damage to body systems (Lingga, 2012).

World Health Organization (WHO) reported that there have been more than 10 million cases of cancer per year in the world (Surh, 2003). Cancer is a disease characterized by uncontrolled cell division due to DNA damage leading to abnormal cell division. Mitotic chromosomes were indicated by the formation of micronuclei. However, carcinogens could trigger cells mitosis (Sutanto, 2009).

Micronucleus test, developed by Heddle (1973) and Schmid (1975), widely used to detect genotoxic effects (Saleh and Ahmad, 2010). Flavonoid and polyphenol are the examples of compounds with antimutagenic activity (Ishaq, *et al.*, 2003). Bombay onion extract (BOE) contained several secondary metabolites, such as flavonoids with IC_{50} value as antioxidant was 88.087 ± 0.333 Sofa (2004).

MATERIALS AND METHODS

Material

Animals used in this study were male mice (*Mus musculus*) 25-35 g and obtained from the Laboratory of Pharmacology, Faculty of Pharmacy, Universitas Sumatera Utara (USU). Mice were maintained for approximately two weeks to adapted to environmental and food.

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Method

This study was conducted by randomized design with a linear model. Twenty-five mice (20-35 g) were divided into 5 groups, with 5 mice in each group. Normal control group (NCG) were given CMC 5 mg/mice/7 days. Mutagen control group (MCG) were given cyclophosphamide at a dose of 50.0 mg/kg intraperitoneally, 4 hours after NCG administration.

Three treatment groups, which are group TG-1, TG-2, and TG-3, were given BOE at the doses of 100; 200; and 400 mg/kg respectively for 7 days. Hereafter, three groups were treated similarly with MCG. After treatment, animals were sacrificed and femur bone marrows were analyzed to count the number of micronucleus.

RESULTS AND DISCUSSIONS

Cyclophosphamide used in this study could increased micronucleus femur leading to mitotic chromosomes (Krishna and Hayashi, 2000). Cyclophosphamide was given at the dose of 50 mg/kg bw, intraperitoneally to induce genotoxicity/mutagenicity.

The observation of micronucleus smear using a microscope with 40x magnification could be observed in Fig. 1.

Micronucleus assay was performed using femur bone marrow. Mitotic chromosome occurrence induced by peritoneal injection of cyclophosphamide at dose of 50 mg/kg bw. Number of micronucleus counted per 200 polychromatic erythrocytes were shown in Table 1.

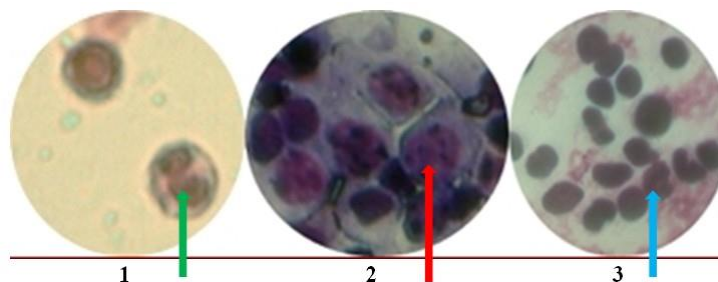


Figure 1. Micronucleus observed Using Microscope with 40x magnification. (1) polychromatic erythrocyte cells without micronucleus, (2) polychromatic erythrocyte cells with micronucleus, (3) mature erythrocyte cells.

Table 1. Number micronuclei in 200 polychromatic erythrocytes

Replication	Control group		Treatments group		
	Negative NCG	Positive MCG	TG-1	TG-2	TG-3
1	28	112	83	65	32
2	33	122	94	70	31
3	27	119	98	68	30
4	30	124	98	67	31
5	31	127	101	74	30
Mean	29.8	120.8	94.8	68.8	30.8
±	±	±	±	±	±
S.D.	2.387	5.718	7.049	3.421	0.837

Based on the result, BOE administration at a dose of 400 mg/kg bw reduced number of micronuclei 8 ± 0.837 . however, this result showed no difference with the negative control ($p > 0.05$).

CONCLUSION

Bombay Onion extract (BOE) inhibit mitotic chromosomes at the a dose of 400 mg/kg bw. However, number of micronuclei showed no difference with negative control ($p > 0.05$).

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