

Evaluation of The Effect of Pasak Bumi (*Eurycoma longifolia* Jack) to Increase Androgen Levels

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Abstract—Background: The ability of reproductive disorders in men and experimental male rat is characterized among other things by a decrease in androgen such as testosterone levels. Materials of pasak bumi root (*Eurycoma longifolia* Jack) increased libido behavior of experimental male rat. Libido associated with higher levels of testosterone, it is therefore necessary to evaluate the effect of pasak bumi on androgen levels such as testosterone. **Methods:** Male rats at 9.00 am treated controls and pasak bumi, then at 14.00 pm tempted with estrus female rats 10 minutes. Then, both control and pasak bumi blood samples were collected from male rat heart on day 1st and day 3rd at 14.15 pm. Measurement of testosterone levels were calculated using radioimmunoassay (RIA). **Results:** An increase in serum testosterone levels in the blood on day-3rd administration pasak bumi boiled water 18 mg/200 g dose significantly different than the control within day 1st to 3rd. The average levels of testosterone administration control (boiled water of aquades) day 1st = 0.50 ng/ml, day 3rd = 2.46 ng / ml, increased markedly on pasak bumi treatment day 1st = 4.00 ng / ml and day 3 = 9.73 ng / ml, (Duncan test, =0.05). **Conclusions:** Testosterone levels can be increased markedly after the consumption of the pasak bumi boiled water for 3 days.

Keywords—Pasak bumi, a dose of 18 mg/200 g, testosterone.

I. INTRODUCTION

Some adult males impaired vitality or reproductive impairments, including a decrease in the androgen hormone such as: testosterone. The public in Borneo Indonesia assumes traditionally that disorders can be corrected by using the root powder of pasak bumi (*Eurycoma longifolia*). The boiled water of pasak bumi increased the libido of male rats significantly on the 3rd day [1]. The next research found cells of basophils increased in the pituitary meanwhile the number cells of acidophils still stabil, after dosing pasak bumi infusion 18 mg / 200 g mm once every morning until the 3rd day [2]. The research with immunohistochemical approached of follicle stimulating hormone (FSH) cells found pasak bumi maintained the number of basophils cells activity that produce the FSH hormone on the 3rd day administration [3]. The purpose of this study was: evaluation the effect of the pasak bumi root on increasing testosterone levels.

Pasak bumi is a tree that can reach 20 m life grows in Borneo. Lancet shaped leaves of pasak bumi with flat edge measuring 2.5 - 14.2 X 0.7 to 4.5 cm. Odd pinnate compound leaves with the number of 11- 38 accumulate on the ends of twigs. Panicle shaped red flowers and fluffy. Yellow fruit reddish when young and becomes black when older. Extracts powder of pasak bumi root (*Eurycoma longifolia*) with a solvent such as water containing: phenolic compounds, tannins, polysaccharides, glycoproteins, and mucopolysaccharide, also includes eurycomanone and longilactone [4;5].

Level of testosterone in the blood always correlated with serum levels of luteinizing hormone (LH). The LH function in men and male animals that stimulates interstitial cells or Leydig

cells in the testes to produce testosterone [6]. LH secretion from the anterior pituitary is mediated by stimulation of cyclic adenosine mono-phosphate (cAMP) and calmodulin synthesis [7]. Stimulation was allegedly played by one or some of the compounds of pasak bumi given on day 1 and day-3 such as eurycomanone and longilactone. I propose one or some compounds of the pasak bumi root serves as Gonadotropin releasing hormone-LH (GnRH-LH), so that the pituitary LH synthesis increased markedly. Furthermore, LH are secreted into the blood circulation. LH arrived in Leydig cells to activate or enhance the work of cells to synthesize testosterone. Testosterone in a relatively short time has been distributed by the bloodstream so that within 1 to 3 days had measurable improvement in the serum.

II. METHODS

A. Laboratory animals

Experimental animals using adult male white rats *Rattus norvegicus* Sprague Dawley strain aged 3 ½ months with a weight of 121-194 g. Rats were obtained from the laboratory animal of Indonesia food and drug supervision agencies. The number of 30 rats, for treatment as follows: 15 males white rats treated with pasak bumi every day, on days 1st and 3rd, after the treatment was tempted to estrus females, sacrificed their each of five male (n = replicates = 5) to take blood from the heart. Similarly, 15 males white rats to the control group performed with distilled water delivery schedules as treatment pasak bumi. A number of five female rats, estrus was selected to be used as a teaser. Before the pasak bumi was treated, white rats adapted in animal breeding rat cages in animal hospital Darmaga Bogor for 2 weeks. During the study rats were given food and water ad libitum.

B. Pasak bumi materials

Crude plant of pasak bumi root (*Eurycomae longifolia* Jack) derived from herbal market in Banjarmasin Borneo, hulled as in the manufacture of other herbal powder with modifications [8]. The wood from the root of pasak bumi relatively hard was washed and drained and cut into pieces with a length of 7 cm, 2 cm wide and 2 cm thick. Pieces were dried in an oven at 50 ° C for 5 days, then cut into small pieces using a sharp stainless knife. Root pieces of wood are then milled into powder using a specially milled to make flour and then filtered with a sieve mesh 50 (pore size = 300 µm). Crude plant of pasak bumi root (*Eurycomae longifolia* Jack) then stored in a jar in the dry cupboard [2].

C. Experimental Design

The experiment was conducted in animals laboratory in the animal hospital called Rumah Sakit Hewan (RSH) Darmaga Bogor under the supervision of *Institutional Animal Care and*

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Use Committee. Measurement of testosterone using radioimmunoassay (RIA) performed in the laboratory Mandapa Pajajaran street in Bogor . The male white rat, divided into two groups are: The control group ; 1). Control day 1st. 2). Control day 3rd , and the pasak bumi group; 3). Pasak bumi day 1st. 4) Pasak bumi day 3rd. Male white rat at 9:00 am given boiled water pasak bumi 18 mg/200 g bb dose on day 1st , 2nd , and 3rd respectively 5 replicates. Then, the male rats at 14.00 pm seduced by an estrus female rat in a separate wire cage for 10 minutes. The control group did the same thing, except given distilled water 1 ml/200 g bb treated equally. The next, male rats anaesthetized using ketamine (containing ketamil) at 14:15 pm, then the blood was taken from the heart for the measurement of testosterone. Sampling of blood for testosterone measurements performed on days 1st and 3rd only.

III. RESULT

The results of measurements of testosterone levels in day-1st to day-3rd in male rats at estrus females seduced cage treated pasak bumi observation than control contained in Table 1.

Table 1. Serum testosterone levels in the control and pasak bumi on day-1st to day-3rd

No	Treatment	Levels of Testosterone (ng/ml) Mean \pm SD
1	Control day 1 st	0,50 \pm 0,57 ^a
2	Control day 3 rd	2,46 \pm 1,26 ^a
3	Pasak bumi day 1 st	4,00 \pm 1,06 ^a
4	Pasak bumi day 3 rd	9,73 \pm 2,42 ^b

Description: Different superscript lowercase letters in the same column expressed a real difference at 95% level of confidence, (Duncan test, = 0.05).

Serum testosterone levels increased significantly in the treatment doses pasak bumi 18 mg/200 g mm on day-3rd , ie 9,73 ng/ml compared to the control treatment day 3rd , ie 2.46 ng / ml (Duncan test, = 0.05). Elevated levels of testosterone in the average control day 1st and day 3rd , 0.50 ng/ml which increased to 2.46 is still below the average increase in the level of testosterone in the treatment of pasak bumi day 1st and day 3rd , which is 4.00 ng / ml increased to 9.73 ng/ml (Table 1)

Testosterone levels were not significantly different in the control of day-to-3 was statistically (Duncan test, = 0.05) compared to control day-to-1. This phenomenon illustrates that under the influence of temptation treatment of estrous females continuously at 14:00 for 10 minutes once a day for 3 days did not significantly increase the release or secretion of testosterone into the bloodstream by Duncan test was a significant increase in the provision of treatment boiled water pasak bumi 18 mg/200 g bw. Testosterone levels that occurs in the pasak bumi treatment increased on day 1st and day 3rd higher than the control day 1st and day 3rd . Significantly affect the pasak bumi increased testosterone synthesis in the Leydig cells, followed by secretion of testosterone into the blood circulation.

IV. DISCUSSION

The findings of pasak bumi (*Eurycoma longifolia*) experiment explained that an increase in activity-producing cells in the pituitary LH rats treated pasak bumi. This was followed by an increase in the release of LH into the blood, so to the Leydig cells as LH destination cell. Following response was an increase in the activity of Leydig cells, thereby actively producing testosterone, which has been evidenced by an increase in testosterone levels in the blood serum on day-3rd treatment pasak bumi than day 1st (4.00 ng/ml increased to 9.73 ng/ml). Whereas in normal circumstances, total testosterone levels in adult male white rats varied from 0.5 ng / ml to 5.4 ng/ml [9]. The possibility was suggested the compound of the root of pasak bumi such as: eurycomanone and longilactone or eurycomalactone in figure 1 serves as Gonadotropin releasing hormone-LH (GnRH-LH).

Androgen such as: Testosterone is required for the normal development of spermatozoa. Testosterone activate genes in Sertoli cells that trigger the differentiation of these cells in the progression of spermatogenesis spermatozoa as spermatogonia differentiation. Testosterone also affects the response axis response pathway hypothalamic-pituitary-adrenal (hypothalamic-pituitary-adrenal axis or HPA) [10]. Testosterone is also synthesized in amounts far less in female animals by the theca cells of the ovaries, by the placenta, and also by zone reticularis of the adrenal cortex in males and females [11;12]. Total testosterone levels in adult male white rats varied from mean 0.5 ng / ml to 5.4 ng / ml in normal circumstances. Total testosterone levels of male white rat strain Sprague Dawley adult aged 3 ½ months in normal circumstances without being seduced estrous females means measured by RIA method was 0.5 ng/ml, whereas a 4 month old male mice on normal total testosterone levels means is 0, 8 ng/ml [7].

Total testosterone levels of Wistar strain male rat aged 3 months to mature rat normally measured by RIA method means is 3,3 ng/ml [13]. Increased levels of testosterone can occur in a particular treatment, the male rat were placed in locations such as higher temperature habitats than the common habitat (from 23 ° C to 25 ° C), the levels of total testosterone means increase more than 5.4 ng/ml to 11.4 ng/ml [9]. In contrast to total testosterone levels of male white rats, total testosterone levels in older men are ranged of 30 ng/ml to 100 ng/ml, whereas total testosterone levels in adult females is in the range of 3 ng/ml to 7 ng/ml [14;15].



Fig. 1. Chemical structure of Eurycomanone and Eurycomalactone [4;5]

V. CONCLUSION

The administration of pasak bumi boiled water 18 mg/200g dose (= 90 mg/kg) once every morning; first day to day-3rd have increased the Leydig cells to synthesize androgen such as testosterone in male white rats.

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