PRELIMINARY STUDY ON THE EFFECT OF CO-ADMINISTRATION OF GOAT MILK AND NICOTINE ON RAT SPERM PARAMETERS

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Introduction: Nicotine is the most abundant alkaloid of tobacco, considered its main compound and responsible for harmful effects in smokers. Nicotine alters the equilibrium in the various organ systems such as cardiovascular, endocrine and the male reproductive system (Marano et al., 1999; Florek and Marszalek, 1999). The action of nicotine on the testis has been shown to reduce fertility in both experimental and clinical trials (Florek and Marszalek, 1999). Reddy et al. (1998) verified that the chronic nicotine use on mice provoked the reduction in testicular weight and atrophied male accessory sex glands, due to the androgenic depletion. In experimental animals, nicotine has been observed to block the production of sperm and decrease the size of testicle. Milk is considered to be the major source of animal-derived estrogens in human diet (Hartmann et al., 1998). Several reports have suggested that milk consumption is a risk factor for prostate cancer. Men with testicular cancer had consumed significantly more milk during adolescence than controls (Davies et al., 1996). Goat milk is said to have more beneficial properties, at which it helps to prevent iron deficiency and softening of the bones. Lower curd tension and different chemical and physical composition goat milk fat offers greater digestibility. Currently, there was no report on the effect of goat milk on the male reproductive performances. Hence, the focus of this study was to show the potential effect of goat milk on the sperm parameters of nicotine treated rats.

Methods: Sprague Dawley juvenile rats (5 to 6 weeks old) were randomly divided into three groups with seven rats for each group. The rats were housed under standard housing condition and fed with laboratory chow and tap water ad libitum. For nicotine (N) and goat milk (GM) groups, the rats were daily injected with 5.0mg/kg body weight of nicotine and force-fed with 20.0ml/kg body weight of goat milk, respectively. However, for nicotine with goat milk (N-GM) group, the rats were injected with 5.0mg/kg body weight of nicotine and force-fed with 20.0ml/kg body weight of goat milk. After 60 days of treatments, the rats were sacrificed and their reproductive organs were removed for analysis. Sperm from cauda epididymides were collected in Toyoda-Yokoyama-Hosi (TYH) medium. The sperm suspensions were maintained at 37°C, in CO₂ incubator for 45 minutes. Then the sperm concentrations were determined by the number of sperm counted. Sperm morphology and vitality were assessed by eosin nigrosin staining method (NAFA and ESHRE-SIGA, Laboratory Manual, 2002) under light microscope according to the WHO laboratory manual (WHO, 1999).

Results and Discussion: There were no significant differences among the treated groups for body weight, testis weight, testis length and width, prostate gland and epididymis (P > 0.05). Gammaa et al. (2004) reported no signs of toxicity on the organ weight changes and reduced body weights of Wistar rats after treated with milk. Thus, milk showed no adverse effects on reproductive parameters of male or female rats. Significant differences with higher value were observed between GM and N-GM groups for sperm concentration (36.81±11.39 x 10⁵/ml and 31.90±10.18 x 10⁵/ml, respectively) and live sperm (351.71±11.02 and 284.31±10.42, respectively) as compared to N group. Previously, it had been shown that nicotine had toxic influences on sperm count and motility in adult ICR mouse (Kim et al., 2008). Significantly different with higher normal sperm was also observed for GM (188.74±0.69) and N-GM (183.46±0.71) than N (176.06±0.84) group. Mahanem
et al. (2006) reported that administration of nicotine reduced the epididymal sperm count, grade of motility and the percentage of normal sperm morphology. To the best of our knowledge, the effects of goat milk to treat infertility problems in nicotine intake male has not yet been published.

**Conclusion:** This study indicated that nicotine reduced sperm quality and goat milk had a protective effect against the toxic effect of nicotine. It can be suggested that goat milk can be used as another alternative supplement to improve infertility among male smokers due to the nicotine intake.

**KEY WORDS:** Nicotine, goat milk, sperm quality

**References**