Effect Of Nicotine And Goat Milk Co-Administration On Rat Testis And Sperm Parameters

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Abstract: The present study was conducted to observe the beneficial effect of goat milk on the sperm parameters of nicotine treated rats. Sprague Dawley juvenile rats (5 to 6 weeks old) were randomly divided into three groups. 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 the reproductive organs were removed. Sperm were collected from epididymis and assessed for sperm count, viability and morphology. Goat milk (GM) group showed higher sperm count (40.30±13.39 x 10^9/ml), more live sperm (385.49±12.97) and more normal sperm (188.31±0.61) than N and N-GM groups (P<0.05). However, co-administration of nicotine with goat milk (N-GM) gave higher sperm parameters values as compared to that observed in N group (P<0.05). This study suggested that goat milk is potentially useful in increasing the fertility of nicotine treated male rats.

Key words: Goat milk; nicotine; sperm quality; Sprague Dawley rats

INTRODUCTION

Available data do not conclusively demonstrate that smoking reduces male fertility. However, with the increasing debates for the adverse effect of smoking on various semen parameters, smoking is regarded as a risk factor that causes infertility in males (Practice committee of American society for reproductive, medicine, smoking and infertility, 2008). Niu et al. (2010) reported that smoking more than 20 cigarettes daily or smoking greater than 10 years has a deleterious effect on semen volume, sperm motility and morphology in smokers. Tawadrous et al. (2011) reported that smoking increased sperm caspase-9 and DNA fragmentation in heavy smokers. Caspase activity in mature sperm would activate apoptotic machinery which lead to cell death (Paasch et al., 2004). The action of nicotine on the testis has activated an autophagic machinery which lead to cell death and clinical trials (Floros and Marszalek, 1999). There has been increasing concern over the decline of male reproductive health. It includes low sperm counts with concomitant decrease in semen volume and increases in male genital developmental abnormalities such as hypospadias and cryptorchidism (Andersen et al., 2000).

Sharpe and Skakkebaek (1993) reported that male fertility problem was also due to the changes in environment and lifestyle which include exposure to estrogens derived from dairy product.

Milk is considered to be the major source of animal-derived estrogens in human diet (Hartmann et al., 1998). Several reports 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). The adverse effects of milk are rarely discussed in the literature and currently, there was no report on the effect of goat milk on the male reproductive performances. Goat milk is said to have more beneficial properties, which helps to prevent iron deficiency and subsequently, softening of the bones. Lower curd tension and different chemical and physical composition goat milk fat offers greater digestibility. 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 nine 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 intraperitoneally (i.p) injected with 5.0mg/kg body weight of nicotine and force-fed with 20.0ml/kg body weight of goat milk, respectively for 60 consecutive days. However, for nicotine with goat milk (N-GM) group, the rats were injected (i.p) 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. General parameters

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