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Short Communication

Calcium and magnesium in male reproductive system and in its secretion

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ABSTRACT

Laboratory animals like rat (n=10), guinea pig (n=a) and rabbit (n=10) were selected for the study. The reproductive organs and accessory glands were separated, weighed, homogenized and analysed for respective levels of calcium and magnesium. The level of calcium and magnesium were not same in all tissues of same animal species. Higher levels of calcium were recorded from the secretions of corpus epididymis in rat and rabbit and from ventral prostrate glands of guinea pig. However, variable levels of magnesium were found in the secretions of different organs of rat, rabbit and guinea pig.

Keywords: Male reproductive system, Rat, Rabbit, Guinea pig, Calcium, Magnesium

Mann and Mann (1981) and Shivaji *et. al.* (1989) discussed in detail about electrolytes and metals in male genital tissues and semen. The levels of these in semen was treated as useful in diagnosis (Eliasson and Lindholmer, 1972; Skandhan, Jiyo and Amith 2007).

The functions of calcium and magnesium inside and outside the cell are very well known. Calcium calmodulin complex regulates microfilament meditated process and is essential for adenyl cyclase activity. Significant correlation has been reported between cAMP and motility (Tash and Means 1983). However no correlation between calcium and motility is documented.

Acting as a cofactor for about 300 enzymes, magnesium has its important role in protein synthesis, glycolysis and transmembrane transport of ions. In structural maintenance of ribosomes, nucleic acids, and some proteins, magnesium is very useful. Many ATP requiring enzymes use Magnesium -ATP complex as a substrate. Na^+, K^+ ATPase pump at cellular level is an example (Vasudevan and Sreekumari 2005). Similarly appropriate concentration of magnesium is essential for the ciliary movement (Guyton and Hall 2006).

Adult albino (body weight 250-450 gms) rabbit (body weight 1.5 – 2.15 kg) and guinea pig (body weight 400-600gms) were selected from our animal colony for the study. Study was conducted and completed in one season. The animals were maintained at room temperature of 20 – 25°C and exposed to 12-14 day light hours.

All the animals under investigation were supplied standard diet and water adlibitum. Animals were sacrificed and different genital tissues were excised, blood was moped by using Whatman filter paper number 41 (ash free) and organs weighed. In case of rat and guinea pig the values of calcium and magnesium of coagulating glands were included with that of prostate gland.

A known weight of each tissue was homogenized by using motor and pestle into which known amount of triple glass distilled water was added. After centrifugation, supernatant was collected and analysed for calcium and magnesium by using colorimetry (Varley 1969).

The estimated values of calcium and magnesium from each tissue in rat, rabbit and guinea pig were diagramatically presented (Fig 1).

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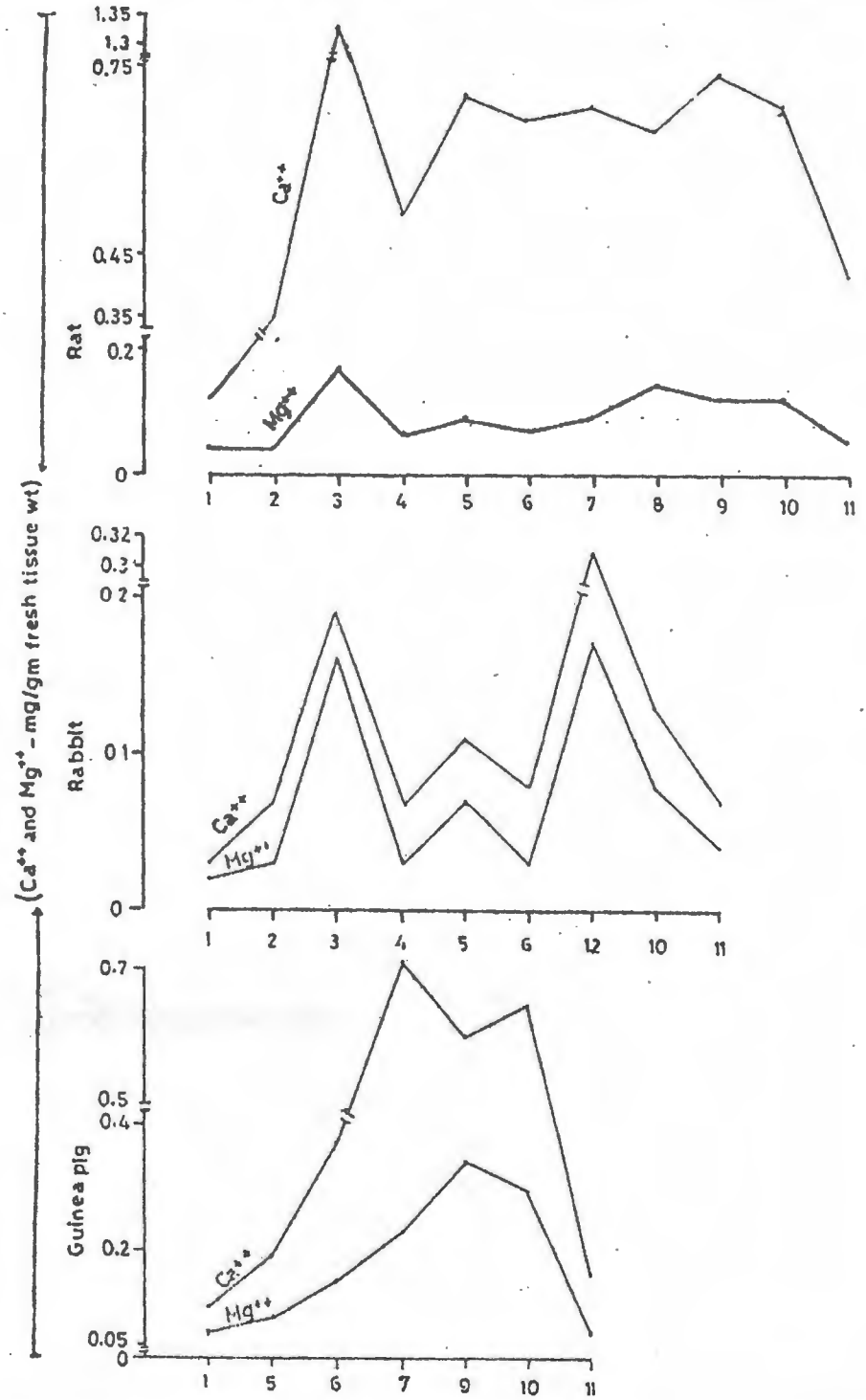

Fig. 1: The concentration of Ca++ and Mg++ in fresh tissues of rat, rabbit and guinea pig genital system (1. Testis, 2. Caput, 3. Corpus, 4. Cauda, 5. Total epididymis, 6. Vas deferens, 7. Ventral prostate, 8. Dorsolateral prostate, 9. Coagulating gland, 10. Total prostate, 11. Seminal vesicle, 12. Ampulla)

The electrolytes and metals present in human and animal semen were estimated by different groups of workers (Mann and Mann 1981; Shivaji *et. al.* 1989). The location of elements present in human semen was identified by split ejaculation technique (Eliasson and Lindholmer, 1972; Skandhan 1981; Valsa *et. al.* 1994). In animal studies, estimation of these elements from homogenized tissue is most acceptable and suitable method. The values recorded in the study in different laboratory animals showed that the elements estimated were not equally distributed in different tissues. Secondly, it was also seen that both calcium and magnesium were not secreted in large amounts from the same tissue in different animals as shown.

Calcium and magnesium in human semen were found to be very important for sperm motility; a deviation from its normal level was held responsible for its pathology and the stimulatory effect of calcium on semen has been reported by (Morita and Chang, 1970; Morton *et. al.* 1974). Lorange *et. al.* (1983) reported the optimum level of calcium for human sperm motility as 0.08 – 1.7 mm. Davis (1978) reported 1.7mM calcium as optimum for rat sperm. It was not injurious up to 5mM. However, the addition of calcium to seminal plasma resulted in sperm immotility (Lorange et. al. 1983). From all these reports it is concluded that calcium and magnesium are important for motility of spermatozoa. For this, it might be require that the elements enter spermatozoa from seminal plasma (Lindholmer and Eliasson 1974; Mann and Mann 1981).

In conclusion, the study showed that origin of calcium and magnesium in reproductive organs of rat, G. pig and rabbits is not the same; and their concentration among different tissues varies, not only in the same animal but between animals also.

	Rat	Rabbit	Guinea Pig
Calcium	Corpus Epididymis	Corpus Epididymis	Ventral Prostate gland
Magnesium	Corpus Epididymis and Dorsolateral prostate	Corpus Epididymis and ampulla	Coagulating and prostate gland

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