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Damages of Paraquat exposure to male reproductive system and affect on spermatogenesis in rats and mice

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Paraquat is one of the most widely used herbicidal chemicals in the world. Even the lowest doses of Paraquat is reported to cause measurable adverse effects on growth, survival and reproduction. Target organ exposure technique was used to investigate specific effects in rats and mice male reproductive system. Wistar rats (6 groups, n=10) were treated with 1 mg /kg body weight of Paraquat by inter-dermal exposure to scrotal sac for a week on every other day. The treatment groups were sacrificed on 14(T1), 21(T2), 28(T3), 35(T4) and 42(T5) days and control as 7 days post treatment. Rats were individually paired with pro-estrus female rats on the day before they were sacrificed. Reproductive parameters including fertilization potential end points were analyzed. Mice (5 groups, n=10) were exposed with four concentrations [8(T6), 4(T7), 2(T8), 1(T9) mg/kg bodyweight] of Paraquat as previously and sacrificed on the day 14th. Testicular and epididymal sperm parameters were measured. DNA integrity of epididymal sperm was assessed using acridine orange staining.

No behavioral or pathological changes were seen for either experiment. There was a significant reduction in testicular weights but reduced testicular counts were seen in T4 & T5. Total epididymal sperm count and motility has been significantly reduced. There was a marked increase in epididymal weight among treatment groups (mice) and significant ($P<0.05$) in T7. Testicular weights did not show changes in mice, indicating reduced effects on testicular endocrine milieu. However, in mice testicular sperm count decreased, epididymal sperm motility decreased and DNA damages were increased significantly for treated groups T6, T7 and T8 ($P<0.05$). In rats reduction of embryo measurements and increased in pre- and post-implantation loss and DNA damages and abnormalities were higher markedly. Effects of Paraquat did not recover until 42 days post treatments, showed persistent effects. However, we observed that the effects in the rat are not exactly similar to those in mice with a similar exposure method. We can conclude that Paraquat damages, which were persistent at least until 42 days to rat male reproductive system is severe that extends from spermatogenesis to fertilization process.

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