

ASSESSMENT OF HEALTH RISK AMONG SPRAY PAINTERS WITH SPECIAL REFERENCE TO REPRODUCTIVE AND ENDOCRINE FUNCTION

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Exposure to solvent-based paints (spray paints) is reported to cause behavioural changes, neurological deficits, reproductive and endocrine dysfunction but most of the evidence came from experimental studies. Only a few reports and some epidemiological studies dealing with male mediated reproductive abnormalities are available in humans. This study was conducted with the aims to evaluate health effects, thyroid and reproductive profile among spray painters who are heavily exposed to harmful and carcinogenic chemicals. A cross-sectional study was conducted in 25 spray painters (exposure, 2-35 yrs) working in State Transport workshop and 35 control subjects from the same premises having similar age and socioeconomic status and had no present and past exposure to solvents and other chemicals. All subjects underwent for complete medical/clinical examination and their life style and occupational history were recorded. Blood samples (6 ml) from both the groups were taken and serum was used for the estimation of thyroid (TSH, total T₃ and total T₄) and reproductive hormones (LH, FSH, and Testosterone) by Radioimmunoassay (RIA).

Results of this study indicated some notable neurological symptoms in spray painters (tingling and numbness, 32%; irritation in eye, 32%; fatigue, 28%; asthenia, 24%; and headache, 16%), psychological symptoms (loss of temper, 52%; lack of memory, 32%; worrying and disliking, 28%; trouble by insomnia, 20%); and clinical findings (tremor,

24%; hypertension, 44%; and vision defects; myopia, hypermetropia, presbyopia 20%, 28% and 12%), respectively. Compared to spray painter group control subjects showed marked low or no symptoms of psychological and neurological manifestations. Levels of thyroid hormones are summarized in Table 1. Studies on thyroid function test revealed significant higher level of TSH ($p < 0.01$) in spray painters as compared to the control group ($3.08 \pm 1.60 \mu\text{IU/ml}$) (Fig. 1). Normal range of TSH as provided by the manufacturer was 0.3-3.1 $\mu\text{IU/ml}$ while we detected it 0.63- 5.08 $\mu\text{IU/ml}$ for our control subjects. T_4 level in spray painters was marginally low but significant ($p < 0.05$). T_3 level was almost normal in all spray painters and ranged from 0.65-1.30 ng/ml. Reproductive hormones revealed no significant changes in both the groups; however, impairments in the levels of LH and FSH were observed in some individuals. Two of the 24 spray painters were having abnormally high level of LH (26.43 IU/l and 12.22 IU/l) against the normal range, 0.5-10.0 IU/l. High levels of FSH (38.63 and 14.11 IU/l) were also detected in these subjects against the normal range 1.3-11.5 IU/l). One spray painter had an isolated elevated level of FSH (39.94 IU/l) with the normal levels of LH and Testosterone. No abnormality in the level of LH was observed in control group while 3 subjects were found to have abnormally high level of FSH. All subjects in control and spray painter group had normal level of testosterone and varied with age.

The present study indicated that psychological symptoms such as loss of temper, lack of memory and worrying, and clinical symptoms such as tremor, vision defects etc were more profoundly evident among spray painters as compared to control. It reflects the possible interference of some chemicals, present as components in spray paints on the synthesis and regulation of thyroid hormones metabolism. Higher cases of suspected hypothyroidism (about 28%) in spray painters against the control (about 8.5%) is an indication of interference of chemicals that affects thyroid hormones levels. Interference of solvent-based chemicals with the uptake of iodine by thyroid gland and further prevention of organification of absorbed iodine with thyroid binding globulins (TBGs) and the release of thyroid

hormones are some of the possible causes of thyroid dysfunction among spray painters.

Fig. 1 Levels of thyroid stimulating hormones (TSH) in spray painter and control

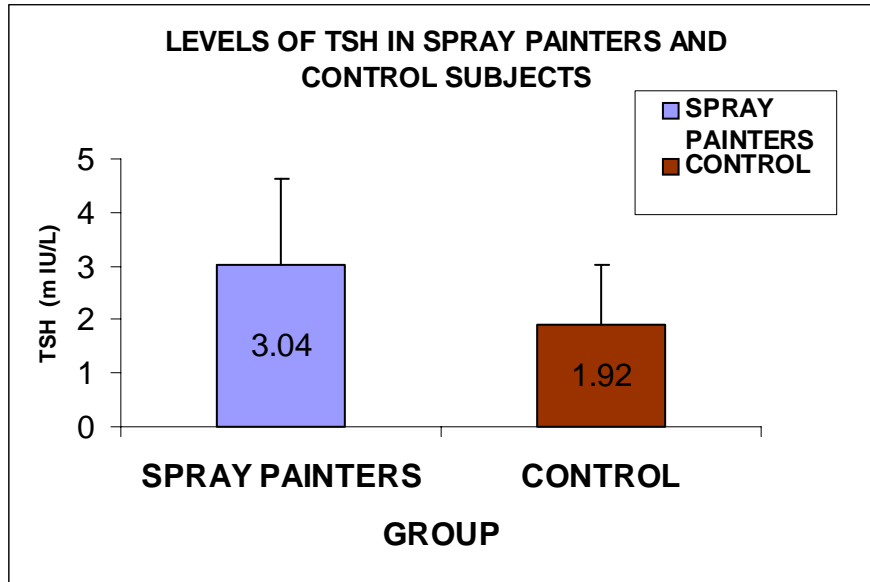


Table 1: Levels of thyroid hormones in control and spray painters (Values represent Mean \pm SD

Parameters	Control Group	Spray painters
TSH (μ IU/ml)	1.917 \pm 1.086	3.08 \pm 1.60**
T ₄ (μ g/dl)	9.72 \pm 2.514	7.75 \pm 1.94*
T ₃ (ng/ml)	1.87 \pm 0.35	1.06 \pm 0.19

* $p < 0.05$, ** $p < 0.01$

The levels of reproductive hormones (LH, FSH and testosterone) were not significantly altered in spray painters, however, isolated individual changes in the level of LH and FSH were registered in few spray painters. High level of FSH and LH in few spray painters is indicative of disruptive endocrine function. This study suggests that spray painters (Fig.2) are at risk of developing psychological, neurological, clinical, thyroid and reproductive impairments.



Fig.2. Spray painters exposed to solvents and chemicals