

Genotoxic and cytotoxic effect of nickel in buccal cell at workers in ferronickel factory

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Abstract

Aim of this study is to investigate the genotoxic effect of nickel in buccal cells at workers of ferronickel factory. We investigated the frequency of micronuclei, also we investigated the binucleated cells, cells with buds, cariolutic and pycnotic cells. The exposed workers has higher level of damage of DNA, compared with control group.

Keywords: *genetical, potentital, risk, nickel, buccal cells.*

Introduction

Cytoigenetic investigation which is done at workers which worked at mining of nickel processing, show that hapend the change of structure and function of genetic material. (IPCS, 1991, IARC, 1190).

Higher doses of nickel inducing acut toxicity at man, if consume through mouth(Sunderman *et al.*, 1988, Daldrup *et al.*, 1983). Also the nickel has effect and in reproduction and embrional developing of man, at workers of mining of nickel (Warner 1979, Costa 1991, Oller 1997). Experimentaly prove at mice that salts of nickel cause denegeration of gerninativ epitel of testis, inhibition of spermatogenesis respectively sterility. (Mathur 1977, Lee 1983).

Material and methods

The study group consisted of 16 subjects (males) 7 workers directly exposed to pollution with nickel. Nine (9) subjects live nearby factory and who are under the impact of these pollution, as control group.

Exfoliated buccal cells were scraped gently with a cytobrush and the material was submersed in 5 ml of saline solution (0.9% NaCl). After centrifugation (10 min at

1200 rpm), the pellet was fixed in 3:1 methanol/acetic-acid once, or twice if necessary, for 5 min. Slides were stained with May-Grunwald-Giemsa according to standard protocol (Tolbert *et al.*, 1992). Exfoliated buccal cells were analyzed under a total magnification of x1000 using a Leica microscope with immersion. The following criteria for MN analysis were used in oral exfoliated cells. MN must: a) be less than 1/3 diameter of the main nucleus, b) be on the same plane of focus, c) have the same color, texture and refraction as the main nucleus, d) have smooth oval or round shape, and e) be clearly separated from the main nucleus. Two slides were prepared for each subject and 2000 cells from each subject were examined, and results were reported as the frequency of cells with micronucleus.

Results and discussion

Results of our investigation are presented at table 1 and 2. Number of micronucleated is higher at exposed workers (19.14/ 1000 buccal cells) compared with control group(13.11/1000 buccal cells). Number of binucleated cells /1000 cells it is higher at control group(24.4/1000 buccal cells) compared with exposed group(21.42/1000 buccal cells). Also the cells with buds, Cariolytic cells, Caryonetic cells, are higher at exposed workers compared with control group. While the picnotic cells are higher at control group compared with exposed workers.

Our results are in accordance with the results obtained from Qayyum (2011) who analysed the level of genetic damage and the level of exposed at with nickel and chrome. Also he analysed the number of micronuclei and other nuclear anomaly at workers.

Our results are in accordance and with the results of Sudha (2011) who find higher frequency of micronuclei and nuclear anomaly at workers exposed in chrome.

Nickel the genotoxic effect express and through producing of free radicals of oxygen(ROS). Through ROS nickel change the structure of DNA(Das *et al.*, 2008).

Table 1. General characteristics and frequency of micronucleus(MN), binucleated cells(BNC), cells with buds, Cariolytic cells, Caryonetic cells and Picnotic cells / 1000 buccal cells at workers of factory Feronickel, and human people of the city Drenas who inhabit nearby the factory

Investigated parameters	Exposed Workers	Control group	t-test t	significancy P
No of subjects	7	9		
Age	46.5 ±11.57	40.22 ±14.93		
Cells with MN/1000 cells	19.14±5.98	13.11±3.018	2.640	0.019*
Binucleated cells/1000 cells	21.42 ±5.25	24.4 ±6.38	-1.010	0.33
Cells with buds 1000 cells	20.28±10.6	19.11 ±7.47	-0.260	0.798
Cariolytic cells/1000 cells	20.42±11.91	5.33 ±3.42	3.644	0.003*
Caryonetic cells/1000 cells	18.85 ±6.86	17.44 ±22.52	0.159	0.876
Picnotic cells/1000 cells	14.14±9.19	15.0±5.31	-0.235	0.818

Conclusion

On base of our results, obtained through investigation at buccal cells at workers of factory, can conclude such as:

- Significantly ($p < 0.019$) higher frequency of micronuclei, Cells with buds, Cariolytic cells and Caryonetic cells, at exposed workers compared with control group.
- higher numebr of binucleated cells and picnotic cells at control group compared with exposed workers.

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