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A STUDY ON THE MICRONUCLEI INDUCTION IN TRAFFIC POLICE POPULATION IN TIRUCHIRAPPALLI, TAMILNADU, INDIA

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ABSTRACT

The micronucleus assays have emerged as one of the preferred methods for assessing chromosome damages because they enable both chromosome loss and chromosome breakage to be measured reliably. The cytokinesis block MN assay deals with most frequently used in hazard identification and risk assessment process. Cytokinesis block MN assay using mononuclear lymphocytes in Traffic Police Population in Tiruchirappalli. The overall view present by the experiment was that as age increase the damage, namely, single stranded breaks and their mis repair resulting in double strand breaks leading to MN, increase in a directly proportional way and reached a peak value of damage at the age group of > 51. Air pollutants enhanced MN in mononuclear lymphocytes in Traffic police population.

Keywords: Genotoxic, chromosome, cytogenetic, traffic police, lymphocyte, micronucleus.

INTRODUCTION

The study of DNA damage at the chromosome level is an essential part of toxicology because chromosomal mutation is an important event in carcinogenesis (Fenech, 2000). Micronucleus test allows estimating the individual amount of chromosome and genome mutations Hovhannisyan (2010). Scoring of micronuclei in polychromatic erythrocytes of peripheral blood is included as a variation of the bone marrow assay (Mavournin *et al.,* 1990). The aim of this study was to assess the cytogenetic effects, such as micronucleus frequency in peripheral blood lymphocytes, and to estimate the association with individual exposure. These cytogenetic markers could be used in the field to assess the genotoxic consequences of burning various cooking fuels (Musthapa *et al.,* 2004).

MATERIALS AND METHODS

Micronucleus assay

The method for cytokinesis block MN assay using mononuclear lymphocytes from peripheral blood of Traffic police population (Fenech and Morely (1985). The culture was set up as described under chromosome aberration assay (conventional method) up to the addition of PHA. Cytochalasin - B at a final concentration of 3µg/5ml culture was added at 44 hours of culture. The cells were further incubated for 28

hours at 37^{O}C. The cells were harvested, given hypotonic treatment, washed and fixed with Carnoy's fixative as described under chromosome aberration assay. The cell suspensions were dropped on to a clear cooled slide from a height of 1 cm and stained with Giemsa. Binucleated cells surrounded by cytoplasm were scored for the presence of MN (Countryman and Heddle, 1976).

RESULTS

The frequency of MN in the age groups showed an interesting aspect (Figure 1). The occurrence of MN within an age group was approximately twice that of the control (278) to that of the TP (609) in < 20 age group and this trend were seen in other groups also (Figure 2). The distribution of MN per cell was seen to vary from 1 MN per cell to up to 4 MN per cell. MN study reveals that there seems to be very less correlation starting from the initial age group of 20 itself and detroiter as the age increases. This can be taken as an indication of the appropriateness of MN to study environment impact using cytogetetics. The p-values indicate that there is significant difference between all the age groups when the control and traffic policemen.

The dispersion pattern showed Poisson, meaning that the events leading to the formation of MN are rare and are similar to that of the DCs formation (Table 1). This is in accordance to the general pattern observed for such studies on environmental impact and shows that the present study reveals the exact nature of relation between MN and DCs.

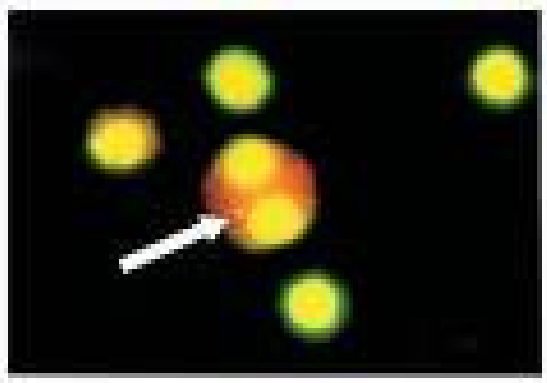

Figure 1. Showing the pattern of Micronucleus.

Table 1. Statistical analysis of the frequency of micronuclei (MN) in control population (CP) and traffic policemen (TP).

Distribution of frequency of micronuclei (MN) among the normal people (NP) and traffic policemen (TP) among the various age groups										
Age Group (In Years)	<20		21-30		31-40		41-50		>51	
Nature of Persons	Control	TP	Control	TP	Control	TP	Control	TP	Control	TP
Micronuclei	278	609	421	795	579	997	683	1291	821	1394
Distribution Of MN Among The Cells	Varied number of cells and the information is incorporated into distribution patterns									
Frequency (Aberrated Cells) (MN/Cells Scored)	0.0278	0.0609	0.0421	0.0795	0.0579	0.9907	0.0683	0.1291	0.0821	0.1394
Frequency Distribution With Regard To Absence Of MN(μ) (Good Cells)	0.042	0.028	0.034	0.025	0.029	0.022	0.027	0.0196	0.0246	0.0189
Correlation Between The Age Groups	0.4112		0.2909		0.0950		0.0751		0.0584	
Nature Of Dispersion (σ^2/y)	PD	PD	PD	PD	PD	PD	PD	PD	PD	PD
p Value (Levels Of Significance)	< 0.05		< 0.01		< 0.005		< 0.001		< 0.001	
Interpretation Of p Value	ES		ES		ES		ES		ES	

Sample Size = 10 / groups.
Number of Cells Scored Per Sample = 1000.
Total Number of Cell Scored Per Age Group = 10000.

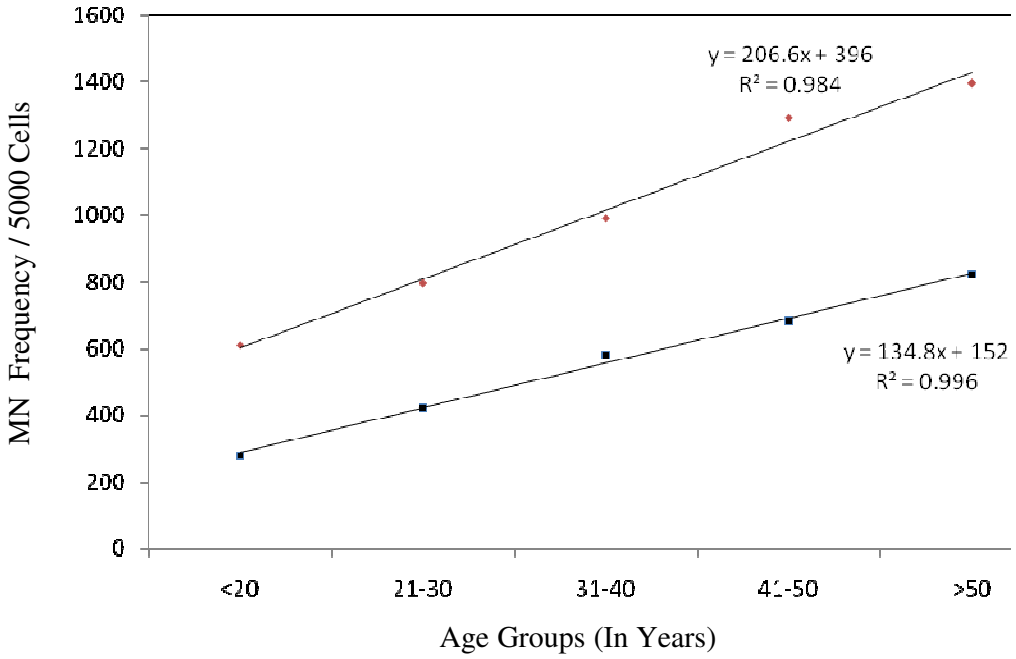

Figure 2. Linear trendline of micronuclei (MN) in control population (CP) and traffic policemen (TP).

DISCUSSION

The present study indicate that genotoxic air pollutants are directly associated with high MN frequency in culture human lymphocytes were observed ($p<0.001$). In this study populations MN frequency was found to be increased with age. This study clearly implies the effect of genetic damages generated not only at the level of chromosomes but also in the level of spindle fiber formation that leads to the complete segregation of the chromatin material during the mitosis to be evenly distributed in the cell.

Similarly, the lymphocyte micronucleus assay was used to measure the average frequency of micronuclei in a population and thus assess genotoxic effects. Data from 174 person's average value of 16.4 ± 7.3 and a slight age-dependence was reported (Berces *et al.,* 1993). The micronucleus assay used to study the effects of environmental mutagen injuries using of metal compounds like cadmium ions. The increased the micronucleus frequency linearly after incubation with whole blood *in vitro* with 10^{-6}-10^{-3} M concentrations for 30 min. Smoking status of current, former or never smoker without consideration of the level of smoking MN frequency was significantly higher in exposed smokers than never smokers (8.83± 5.94 verses 4.84 ± 2.61 $p<0.011$). Further, MN frequencies were higher in older individuals (>30 years age) than younger subjects (Maffei *et al.,* 2002). MN frequency of Japanese hard medal workers had significantly higher ($p<0.05$) and potential cytogenetic damage associated with pesticide effects in agriculture workers at Athens (Peixin *et al.,* 2009 and Pastor *et al.,* 2001). MN was applied in exfoliated cells of buccal mucosa to assess genotoxic risk associated with occupation exposure of cement industry workers (Sellappa and Mythili, 2009). The present report supported to occupational exposure of crystalline silica containing dust. The frequency of MN was statistically higher in the workers ($p<0.001$) (Demircigil *et al.,* 2010). The present study suggested that the effect of occupational exposure to enhance MN induction in peripheral lymphocytes of traffic police populations.

Conclusion

Air pollutants enhanced MN in mononuclear lymphocytes in Traffic police population. MN assay useful to biomonitoring of radioactive materials.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this article.

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