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EFFECT OF AIR POLLUTANTS ON PROTEIN AND GLUCOSE LEVEL OF ALBINO RAT AT INDORE (M.P.)

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Abstract:
The aim of the present study is to evaluate the impact of Air pollutants (PM_{10}, SO_2 and NO_X) on some biochemical parameters of Albino rat. Three different sites of Indore city viz; Kothari market (commercial), Sanver road (industrial) and Vijay nagar (residential) were selected for investigation . Animal was exposed for four months (June to September) on these sites and Blood samples were collected for estimation of Protein (g/dl) and Glucose (mg/dl) level. Results indicate the decreased level of Protein and Glucose (P<.01%). Pollutants level of these sites was more than tolerable limit. The values of experimental group were significant checked by student T-test. The study reveals that Air pollutants adversely affect on biochemistry of Albino rat.
Keywords: Air pollutants, Indore, Albino rat, Protein, Glucose.

Introduction

Indore growing rapidly in size and diversity with increasing emission from vehicle, industries, and traffic. Millions of peoples are exposed to this poor quality air. This air badly effect the lung eye nose and whole respiratory tract, causes serious health problem like Asthama, Bronchitis, Emphysema, Elergy. According to figure available with Madhya Pradesh pollution control board in Indore emission from vehicle cause the maximum pollution in the city .Around 60% of the entire particulate matter is caused due to vehicular emission while the rest caused by industrial and domestic pollution (Hindustan times June 5,2016,Nida Khan).Air pollution is one of the major causative factor behind the 10-12% incidence of bronchial asthma in the age group of 5-6 year in India (Chabra 1996).In Indore city the standard level of pm10 must be 60mg /m3 but now a days it reaches up to 200mg/m3 and more the condition are worst in the month of summer because dust particles are as more as compare to other month .They are easily inhaled and entered in the lung. Asthmatic population appears to be more susceptible to the impact of particulate and SO2 exposure (Mukhopadhyay 1997).

Particulate matter alone or in combination with SO2 are found to be major cause of illness of health that leads to at least 500,000 premature death and 4-5 million new cases of chronic bronchitis every year (World Bank Report, 1992).

In Indore city the standard level of PM 10 must be 60 mg/M3 but now days it reaches up to 200 mg/M3 and more. The conditions are worst in the month of summer because dust particles are as more as compare to other months. They are easily inhaled and entered in the lungs tissue. It consisting of complex and varying mixture of particles suspended in the breathing air, which vary in size and composition, and are produced by a wide variety of natural and anthropogenic activities (Poschl, 2005).

Thus looking to the importance regarding good health of the citizens of Indore city, the present investigation has been aimed to assess the Biochemical parameters in albino rat on exposure to air pollution in Indore city.

Materials and Methods

Experimental Animal

Albino rat (male and female) were purchased from registered shop and kept in cages. Each cage contains 6 rats, out of which 5 were female and 1 male. Weight of animal was measured as 150-200 grams. Animal will be active and disease free. Food and water will be provided in sufficient amount to animal.

Experimental Area

Indore-Indore City located at 220 43' latitude (North) and 750 57'Longitude (East) with general elevation of about 550 meters above mean sea level (MSL). It is located on the southern edge of Malwa plateau. The city is located 190 km west of the state capital of Bhopal. Average humidity is reported as 50% (Source HKO).

Experimental Design- Animals were divided into two groups.

Control Group – In this group, 6 rats were taken in cage (5 male rats and 1female rat). Here sufficient amount of animal food and water will be given to animal under controlled conditions.

Experimental Group – In this group, three cages will be prepared. Each cage contains 6 rats (ratio will be same as control group), than animal will be exposed to the selected sites viz:

Vijay Nagar (residential), Kothari Market (commercial) and Sanver Road (industrial).

Exposure Duration-One year exposures were given to animal. Data of June-July and August-September (2014-15) were documented and analysed statically.

Biochemical study- Blood sample were collected from the retro orbital puncture. The collected blood sample were centrifuged a 3000 rpm for 10 minutes to separate the sera. The sera were kept in deep freezer for further analysis of different parameters.

Statistical analysis - The results of present investigation were expressed as mean (Triplicate) and standard deviation. The level of significance between the means of control and the experimental groups were analyzed by Student's t-test. Whereas, their differences were found to be statistically significant at P<.01 except (*) which are significant at P<0.05.

Results The control value of protein (g/dl) were reported as 7.21±0.0100 where as in Kothari market, Sanver road and Vijay nagar the values were reported 2.47±0.0346, 1.44±0.0153 and 2.67±0.0267. The control value of glucose (mg/dl) during June-July 58.21+0.1102, and experimental values were 48.31±0.0656 43.31+0.0557 and 52.00±0.5292 estimated in Kothari market, Sanver road and Vijay nagar respectively (Table-1).

Similarly these values were recorded in the month of August –September .The value of protein was 17.81±0.0173 in control group where as in experimental group in three different experimental zones were 2.0±0.0404, 1.21±0.0153 and 2.67±0.0265 respectively. The control value of glucose were reported 80.00+±0.1007 where as in Kothari market Sanver road and Vijay nagar the values were 58.17±0.0289, 57.21±0.0458 and 40.00±0.0404 respectively (Table-2).

Discussion

In present investigation the protein (g/dl) and glucose level was found to be decreased (P<.01) except (*) which are significant at (P<0.5) at Indore city in all three mentioned sites. Protein is very essential biomolecule for body development and different mechanical functions like cell signalling, immune response, cell adhesion and cell cycle. Further studies found that these all protein dependent cycles were effected due to protein alteration as, study on exposures to high particulate air pollution found alveolar inflammation that release mediators capable of exacerbating lung disease and increased blood coagulability in eosinophils individuals (Seaton, 1995). Several studies found abnormal red cell, neutrophil and platelet levels (Salvi et al., 1999), increase in blood viscosity (Schwartz, 2001), and changes in the number of T-lymphocytes, B-lymphocytes, and NK cells (Salvi et al., 1999) in response to air pollution exposure. PM10 associated with alteration in glucose HbA1c and lipid, especially among people with diabetes (Maayan YS, 2016).

References

Chhabra, S.K. Prevalence of Bronchial Asthma in school children of Delhi Vallabbhai Patel Chest Institute New Delhi. **(1996).**

Maayan Yitshak Sade, Itai Kloog, Idit F. Liberty, Joel Schwartz, and Victor Novack "The Association between Air Pollution Exposure and Glucose and Lipids Levels". J Clin Endocrinol Metab, 101(6):2460–2467. **(2016)**.

Mukhopadhyay K. "Industrial CO2 emission in India during 1991-92 to 1996-97". An input-output approach paper. Accepted for the 36th Annual conference on the India econometric society held at Devi Ahilya University, Indore (4-6 Feb'). **(2003).**

Poschl, U. "Atmospheric aerosols: composition, transformation, climate and health effects". Angew. Chem. Int. Ed. Engl. 44, 7520. **(2005).**

Salvi S, Blomberg A, Rudell B, Kelly F, Sandstrom T, Holgate ST, Frew A. Acute inflammatory responses in the airways and peripheral blood after short-term exposure to diesel exposure in healthy human volunteers. Am J Respir Crit Care Med, 159, 702-709, **1999.**

Schwartz J, Ballester F, Saez M, Perez-Hoyos S, Bellido J, Cambra K, Arribas F, Canada A, Perez-Boillos MJ, Sunyer J. The concentration-response relation between air pollution and daily deaths. Environ Health Perspect, 109,1001-1006, **2001.**

Seaton A, MacNee W, Donaldson K, Godden D. Particulate air pollution and acute health effects. Lancet, 345, 176-178, **1995.**

World Bank Report). World Bank publication. **(1992).**