A study of environmental factors on miscarriages in women

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**Abstract**

The objective of this study is to present a profile on the environmental factors and their impact on human infertility. 200 aborted subjects in Chennai metropolitan city, were analyzed for the reasons for miscarriages. A comprehensive, questionnaire related to their medical, surgical family history, life style habits, consangunity, glucose level, blood pressure, type of infertility, BMI etc., were collected, with informed consent of women. The aborted samples were collected and analyzed for chromosomal abnormalities, using chorionic villi sampling culture method. Out of 200 subjects 30% were missed abortion, 27.5 % were due to the absence of cardiac activity in the fetus and in few cases, syndromes and ploidy were observed. With this background a study was initiated to analyze the tentative factors involved in early abortions due to chromosomal abnormalities. It was brought to the light that many of the environmental factors / agents might be multifactorial causation for chromosomal abnormalities in the fetus and consecutively leading to early abortions, where the subjects parent’s genetical background seems to be normal.

**Keywords:** environmental factor, sampling, pollution, epidemiology

Received: 19th December; Revised: 20th January; Accepted: 24th January; © IJCS New Liberty Group 2012

**Introduction**

Environmental epidemiology is the branch of science concerned with discovery of the environmental exposures that contribute to various issues related to human health. Epidemiology is the study of health events or determinant patterns in a population. It is the cornerstone method of public health research (Ray Merill, 2010). Major areas of epidemiological work include, out break investigations, diseases surveillance and screening. This helps us to understand better the proximate exposures (Kamleshwar Pandy et al., 2000) including all factors or agents which causes environmental pollution and distal exposures (Armond Lernke, 1983), which are indirectly related to environmental changes and their measurements in the environment. In the recent years infertility and early abortions are the major issues of concern world wide. The incidence has increased atleast three fold in all developed countries, suggesting the importance of environmental risk factors. This state of affairs is mainly the result of the lack of priority that has been given to research on reproduction in epidemiology and toxicology (Gunell, 2004). Our current knowledge of the epidemiology of infertility is limited. As infertility rates continue to climb in many countries, more and more experts are looking at possible environmental factors as a potential cause of infertility and recurrent pregnancy loss (Hill et al., 1965). Therefore the knowledge of role of environmental factors which we live along with, may help us to empower people with fertility problems. Environmental pollution and associated risk factors are of major concern today. Vulnerability of diseases is the summation of all risk factors population experiences, when exposed to environmental agents. In epidemiology, environmental diseases are caused by environmental factors, in those who are genetically predisposed to particular conditions. Similarly sensitivity and responsiveness of individual to these factors also mediates the risk factor.

Reproduction or development can be affected by exposure to a wide variety of agents (Gupta and Salunkhe, 1985), including dioxin, polychlorinated biphenyls (PCB’S), phytoestrogens such as isoflavones, heavy metals, chlorination, disinfection byproducts in water, organic solvents, poly-aromatic hydrocarbons, particulate air pollution, substances emitted from landfill sites, caffeine, pesticides (Devaraj Urs, 1991) cosmetic...
products etc. Theses toxins may have direct impact on exposures or they enter through the food web into the human systems and causes irreversible impact in human beings. Environmental causes of infertility and miscarriages provides surprising evidences on how many common chemicals in the home and workplace can damage the reproductive process (Samuels et al., 1987). Chromosomal abnormalities of the fetus are the most common cause of sporadic miscarriage, but environmental factors and toxins are found to influence the chromosomal abnormalities (Mendiola et al., 2008).

Miscarriages warn us of genetic damage, 90 % of fetus with malformations are spontaneously aborted during early pregnancy, 60% of first trimester spontaneous abortions have chromosomal abnormalities (Frank Sullivan, 1993).

Materials and methods

In the present study 200 aborted subjects were analyzed in the PerkinElmer Health Science Pvt. Ltd., The aborted products were analyzed by using chorionic villi sampling. Anthropometric measurements obtained from 200 couples were analyzed. A comprehensive questionnaire related to their medical, surgical, family history, life style habits, consanguinity, glucose level, blood pressure, type of infertility, BMI etc were collected. G-band analysis using chorionic villi sample culture technique was done (Rooney and Czepulowski, 2001). Idiogram was done with automated karyotyper machine using cytovision software.

Results

With reference to 200 aborted subjects, 9 % of subjects were aborted because of chromosomal abnormalities whose parent had normal karyotypes. 4.5% of subjects were aborted because of the different chromosome groups (B, C, D, E, F and inversion F) condition of the fetus (Fig 2). In the chromosome groups few groups are inversion group and few are deletion group. 26% of subjects were of no regular heart beat in the fetus, and no foetal growth and hence aborted.

In the present study, 200 aborted subjects were observed in the cytogenetic laboratory in Metro Politian City, Chennai. Out of 200 subjects 30% were Missed abortion and 27.5% were due to the absence of cardiac activity in the foetus, (Table 1, Fig. 1). In few cases, syndrome was observed. In the 200 patients, 1% of Edward’s syndrome, 0.5% of Turner’s syndrome, 0.5% Down syndrome and 1.5% of Triploidy, 1% Tetraploidy were observed.

Table 1. Percentage showing the various reasons for abortion in 200 patients

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missed abortion</td>
<td>30%</td>
</tr>
<tr>
<td>No cardiac activity</td>
<td>27.5%</td>
</tr>
<tr>
<td>No foetal growth</td>
<td>13.5%</td>
</tr>
<tr>
<td>No foetal heart beat</td>
<td>12.5%</td>
</tr>
<tr>
<td>Conception</td>
<td>7.5%</td>
</tr>
<tr>
<td>Tetraploidy</td>
<td>1%</td>
</tr>
<tr>
<td>Triploidy</td>
<td>1.5%</td>
</tr>
<tr>
<td>Edward’s syndrome</td>
<td>1%</td>
</tr>
<tr>
<td>Down’s syndrome</td>
<td>0.5%</td>
</tr>
<tr>
<td>Turner’s syndrome</td>
<td>0.5%</td>
</tr>
<tr>
<td>B group chromosome</td>
<td>0.5%</td>
</tr>
<tr>
<td>C group chromosome</td>
<td>1.5%</td>
</tr>
<tr>
<td>E group chromosome</td>
<td>0.5%</td>
</tr>
<tr>
<td>D group chromosome</td>
<td>1%</td>
</tr>
<tr>
<td>F group chromosome</td>
<td>0.5%</td>
</tr>
<tr>
<td>Inversion Y chromosome</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

Fig. 1. Showing the percentage of aborted patients with various reasons
Infertility, particularly in female appears to be a major concern affecting physiological, sociological and psychological dimensions of several million young couples world wide (Leku, 1993). In the cosmopolitan population the number of infertile couples seeking medical treatment is increasing day by day. The important factors contributing to female infertility are environmental agents. It was brought to the light that many of the environmental factors / agents might be the multifactorial causation for chromosomal abnormalities in the fetus and consecutively leading to early abortions, where the subjects-parent’s genetic background seems to be normal (Altmae, 2010). Therefore the knowledge of role of environmental factors, which we live along with, may help us to empower people with fertility problems. The results obtained from the present study on role of environmental factors in female fertility are discussed in the light of findings of various investigations.

Abortion of the first trimester, loss of histologically recognized pregnancy, or a loss based on ultrasonographic findings (Witox et al., 1988). Several pathways have been implicated in the etiology of abortions, which includes environmental and genetical factors.

Environmental factors → genetic factors → Human health.

In the present study, 200 cases were analyzed for the reasons of abortions, in that many subjects had chromosomal abnormality and this may be the major reason for the abortions, whereas chromosomal abnormality is not inherited from their parents. So possibilities of environmental factors being effective causatives of change in the chromosomes leading to mutations, inturn the chromosomal abnormalities. Despite extensive research on the environmental issue, the higher prevalence of environmental diseases is seen throughout the world. Geographical variations in environmental factors, and associated risk factors have recognized world wide. The implications of these findings for National Prevention strategies should be vigorously explored.

Summary

The present studies shows 9% of incidence of chromosomal abnormalities which might be due to hazardous environmental factors which are prevalent throughout the world and hazardous. If this is unnoticed, might lead to serious problems in the near future, studies have demonstrated that majority of serious problems arises due to environmental pollution. So it is the need of the hour to collect data from individual countries in
accessing the prevalence of different environmental factors hazardous to human. This precedes a crude data on the burden of disease in the population and has huge public impact.

Acknowledgement

The authors acknowledge Dr. G. Gazala jabeen, Perkin-Elmer Health Science Pvt. Ltd., Chennai for the help rendered to carryout our research study.

References


