

Correlate between Socioeconomic Status with Oxidative Stress in HIV /AIDS Pregnant Women's

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Abstract

Background - Stress during pregnancy can have serious adverse outcomes on the mother, the fetus, newborn, children and even adolescents. Socioeconomic status has been recognized as a predictor of stress amongst pregnant women

Aims and Objectives: The aim of the study is to determine the correlation between oxidative stress and socioeconomic status of HIV /AIDs pregnant women.

1. To determine oxidative stress levels we will measure :

Glutathione (GSH) concentration

Malondialdehyde (MDA) concentration

Total Antioxidant Status (TAS)

Glutathione Peroxidase (GPx)

Super Oxide Dismutase (SOD)

2. To correlate socioeconomic status with oxidative stress in HIV/AIDs pregnant women's.

Result - Shows the level of hormones in normal pregnant women and HIV positive pregnant women. Hormone level in HIV pregnant women were significantly decreased found compare to normal pregnant women. Conclusion: Although the prevalence of HIV in India is low, the lack of strong wealth patterning in the risk of HIV suggests a more generalized distribution of HIV risk than some of India's high-risk group HIV prevention policies have assumed. The positive association between state economic development and individual risk for HIV is intriguing and requires further scrutiny. On the basis of our result we concluded that the HIV positive pregnant women experience more free radical injury than those with HIV negative pregnant women. Due to oxidative stress, when highly induce it is involved in tissue damage. These mechanisms lead to the decrease of the antioxidant capacity of the body in HIV positive pregnant women.

Keywords - AIDs, HIV, CD4+T, ROS, GSH, MDA, TAS, GPx and SOD.

Introduction

In 1986 the first case of HIV/ AIDs was detected in India and since then HIV infection has been reported in all states and union territories, in 1987 India launched a National AIDS Control Program. Manipur, Nagaland, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra states are considered to have high of HIV/AIDs prevalence (>1%). The prevalence of HIV infection among pregnant women in India is coming down and current it is around 0.7% but still India is in the top 10 countries with high prevalence of HIV among pregnant women and third largest country in HIV epidemic.

Socioeconomic status (SES) encompasses not just income but also educational attainment, financial security, and subjective perceptions of social status and social class. Socioeconomic status can encompass quality of life attributes as well as the opportunities and privileges

afforded to people within society. Poverty, specifically, is not a single factor but rather is characterized by multiple physical and psychosocial stressors. Further, SES is a consistent and reliable predictor of a vast array of outcomes across the life span, including physical and psychological health. Thus, SES is relevant to all realms of behavioral and social science, including research, practice, education and advocacy. Globally, the adverse socio-economic impact of HIV and AIDS is visible at the household, sectoral, and at the macro level; in 2012, it's estimated that there were 35.3 million people living with HIV and 2.3 million are newly infected.^[1] Within twenty years, AIDS became a global epidemic; an estimated 20 million people died, and an additional 36 million people were living with its causative agent –human immunodeficiency virus (HIV).^[2] India has the third largest HIV epidemic in the world. In 2015, HIV prevalence in India was an estimated 0.26%. This figure is small compared to most other middle-income countries but because of India's huge population (1.2 billion) this equates

to 2.1 million people living with HIV. In India's HIV epidemic is slowing down, with a 32% decline in new HIV infections (86,000) in 2015, and a 54% decline in AIDS-related deaths between 2007 to 2015.^[3] India has the third largest HIV epidemic in the world. The HIV epidemic in India is driven by heterosexual sex, which accounted for 87% of new infections in 2015. However, the epidemic is concentrated among key affected populations such as sex workers.

Although the burden of the epidemic varies considerably between countries and regions, it is estimated that 0.8 % of adults aged 15-49 years worldwide are living with HIV. The HIV/AIDS epidemic remains a serious public health challenge, especially among women of childbearing age, who make up 46 % of the global HIV burden. The UNAIDS Global Report (2013) also highlights that women constitute 52 % of all HIV infections in low- and middle-income countries.^[1] HIV infected women are vulnerable to various reproductive health issues. Spontaneous abortion and stillbirths appear to be more common among HIV-infected women.^[4,5] Medical termination of Pregnancy is legalized in India, but rural young and unmarried women frequently access unqualified practitioners who conduct abortions in unsafe settings.^[6]

HIV or AIDS pregnant women suffer from several opportunistic infections that occur because of poor immunity. The HIV infection is cellular CD4 immunodeficiency. Different agents appear may trigger apoptosis in CD4+ T cell, including viral protein, inappropriate secretion of inflammatory cytokines by activated macrophages and toxins produced by opportunistic microorganism. Since oxidative stress can also induce apoptosis, it can be hypothesized that such a mechanism could participate in CD4+ T cell apoptosis observed in AIDS. Oxidative stress results from the imbalance between reactive oxygen species (ROS) production and inactivation.^[7] Under most circumstances, oxidative stress is deleterious to normal cell functions. An emerging view, however, is that, within certain limits, cellular redox status is a normal physiological variable that may elicit cellular response such as transcriptional activation, proliferation or apoptosis. Exposure to oxidants challenges cellular systems and their responses may create conditions that are favorable for the replication of viruses such as HIV. In the present study, we studied oxidative stress as an indicator of oxygen radical activity and antioxidant defenses in HIV / AIDS

pregnant women at CCM Medical College Durg, Chhattisgarh.

Aims and Objectives of Present Study

The aim of the study is to determine the correlation between oxidative stress and socioeconomic status of HIV / AIDS pregnant women.

1. To determine oxidative stress levels we will measure:
 - Glutathione (GSH) concentration
 - Malondialdehyde (MDA) concentration
 - Total Antioxidant Status (TAS)
 - Glutathione Peroxidase (GPx)
 - Super Oxide Dismutase (SOD)
2. To correlate socioeconomic status with oxidative stress in HIV/AIDS pregnant women's.

Material and Methods

I. Selection of Patients

The study was conducted in the Dept. of Biochemistry and in collaboration with Obstetrics and Gynecology Dept. at CCM Medical College Kachandur, Durg (CG). Investigation was carried out in 100 pregnant women suffering from HIV or AIDS and compared with 100 normal control group composed of age matched healthy pregnant women.

II. Collection of blood samples

Overnight fasting venous 5ml blood samples were collected from HIV or AIDS and normal healthy pregnant women in plain bulb and EDTA bulb. The plasma was separated from plain vacuum tube, aliquoted and stored at -20°C and used for the estimation of glutathione reductase (GR), glutathione peroxidase (GPx), Superoxide dismutase (SOD), Malondialdehyde (MDA), and total antioxidant. Serum GR, GPx, SOD and total antioxidant activity were measured by using ELISA and reagents kits will purchased from ERBA Transasia Pvt. Ltd.^[8-11]

III. Data Analysis

Data were expressed as mean \pm SD. Mean values were assessed for significance by paired student t test. A statistical analysis was performed using the Stastical Package for the Social Science program (SPSS, 21.0). Probability values $p < 0.05$ were considered statistically significant.

Table no 1: Shows Age wise distribution of normal pregnant women and HIV/ AIDS pregnant women.

Age Group	Pregnant Women (n=100)	HIV Pregnant Women (n=100)
23-24 yrs	12	8
25-26 yrs	34	23
27-28 yrs	30	27
29-30 yrs	15	31
Above 31	9	11

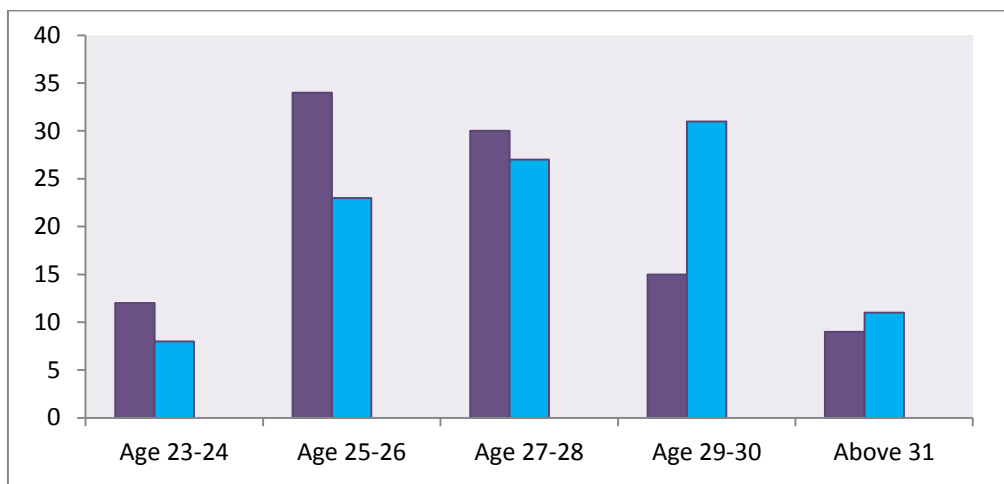


Table no1 and graph I showed the age wise distribution of HIV pregnant women and normal pregnant women. In age group 23-24 there were 12 normal pregnant women and 8 HIV pregnant women. Total 34 normal pregnant women and

23 HIV pregnant women in 25-26 age group. Age group 27-28 and 29-30 contains 30, 15 normal pregnant women and 27, 31 HIV pregnant women. And 9 normal pregnant women and 11 HIV pregnant women in above 31 age group.

Table -2: Socio-Economic Classes of normal Pregnant and HIV-Pregnant Females.

Socio-Economic Group	Normal Pregnant females	HIV-Pregnant Females	Total
upper class	20	20	40
upper middle class	20	20	40
lower middle	20	20	40
upper lower	20	20	40
lower	20	20	40
Total	100	100	200

Observation, Result and Discussion

Table 3: Activity of Biochemical parameters in (Normal Pregnant and HIV-Pregnant women) – upper socio-economic class.

Parameters	upper class	N	Min	Max	Mean	Std	P-value
Gluta.Reduction (Ug/HB)	Pregnant	20	3.0	6.0	4.4	0.87	0.002
	HIV Pregnant	20	1.9	6.0	3.3	1.15	
Gluta.Peroxidase (Ug/HB)	Pregnant	20	20.0	31.0	26.7	3.11	<0.001
	HIV Pregnant	20	13.0	22.0	19.0	2.29	
SOD (Ug/HB)	Pregnant	20	600.0	1300.0	920.9	178.77	<0.001
	HIV Pregnant	20	450.0	908.0	708.6	131.91	
MDA (nmol/L)	Pregnant	20	4.0	5.0	4.5	0.32	<0.001
	HIV Pregnant	20	4.5	6.3	5.5	0.57	
Total Antioxidant Status(mmol/L)	Pregnant	20	0.9	1.5	1.2	0.18	<0.001
	HIV Pregnant	20	0.5	1.0	0.9	0.18	

Table 4: Activity of Biochemical parameters in (Normal Pregnant and HIV-Pregnant women) – upper middle socio-economic class.

Parameters	upper middle class	N	Min	Max	Mean	Std	P-value
Gluta.Reduction (Ug/HB)	Pregnant	20	3.6	6.0	4.6	0.7	0.017
	HIV Pregnant	20	2.0	6.0	3.8	1.2	
Gluta.Peroxidase (Ug/HB)	Pregnant	20	23.5	31.0	27.6	2.1	<0.001
	HIV Pregnant	20	13.0	23.5	19.5	2.8	
SOD (Ug/HB)	Pregnant	20	600.0	1302.0	914.9	216.8	<0.001
	HIV Pregnant	20	400.0	850.0	670.0	118.5	

MDA (nmol/L)	Pregnant	20	4.1	5.2	4.5	0.3	<0.001
	HIV Pregnant	20	5.0	6.3	5.5	0.6	
Total Antioxidant Status(mmol/L)	Pregnant	20	0.9	1.6	1.2	0.2	<0.001
	HIV Pregnant	20	0.6	1.0	0.9	0.1	

Table 5: Activity of Biochemical parameters in (Normal Pregnant and HIV-Pregnant women) – lower middle socio-economic class.

Parameters	lower middle class	N	Min	Max	Mean	Std	P-value
Gluta.Reduction (Ug/HB)	Pregnant	20	3.0	6.0	4.4	0.8	0.021
	HIV Pregnant	20	2.0	6.0	3.6	1.2	
Gluta.Peroxidase (Ug/HB)	Pregnant	20	20.0	31.0	26.1	2.9	<0.001
	HIV Pregnant	20	13.0	23.5	19.4	2.6	
SOD (Ug/HB)	Pregnant	20	700.0	1302.0	988.9	182.4	<0.001
	HIV Pregnant	20	400.0	890.0	664.8	114.1	
MDA (nmol/L)	Pregnant	20	4.0	5.2	4.6	0.3	<0.001
	HIV Pregnant	20	5.0	6.3	5.5	0.5	
Total Antioxidant Status(mmol/L)	Pregnant	20	0.9	1.6	1.2	0.2	<0.001
	HIV Pregnant	20	0.6	1.0	0.9	0.1	

Table 6: Activity of Biochemical parameters in (Normal Pregnant and HIV-Pregnant women) - upper lower socio-economic class.

Parameters	upper lower class	N	Min	Max	Mean	Std	P-value
Gluta.Reduction (Ug/HB)	Pregnant	20	3.0	6.00	4.17	0.80	<0.001
	HIV Pregnant	20	1.9	4.90	3.09	0.95	
Gluta.Peroxidase (Ug/HB)	Pregnant	20	20.0	31.00	27.15	2.66	<0.001
	HIV Pregnant	20	15.0	23.50	20.23	2.08	
SOD (Ug/HB)	Pregnant	20	600.0	1300.00	916.6	207.37	<0.001
	HIV Pregnant	20	400.0	908.00	661.6	150.26	
MDA (nmol/L)	Pregnant	20	4.0	5.00	4.46	0.33	<0.001
	HIV Pregnant	20	4.5	6.30	5.42	0.60	
Total Antioxidant Status(mmol/L)	Pregnant	20	1.0	1.40	1.19	0.15	<0.001
	HIV Pregnant	20	0.5	1.00	0.84	0.18	

Table 7: Activity of Biochemical parameters in (Normal Pregnant and HIV-Pregnant women) - lower socio-economic class.

Parameters	lower class	N	Min	Max	Mean	Std	P-value
Gluta.Reduction (Ug/HB)	Pregnant	20	3.00	6.00	4.35	0.72	0.078
	HIV Pregnant	20	2.00	6.00	3.79	1.18	
Gluta.Peroxidase (Ug/HB)	Pregnant	20	20.00	31.00	28.25	2.61	<0.001
	HIV Pregnant	20	13.00	23.50	19.53	2.76	
SOD (Ug/HB)	Pregnant	20	789.00	1302.00	983.35	182.26	<0.001
	HIV Pregnant	20	400.00	850.00	670.00	118.55	
MDA (nmol/L)	Pregnant	20	4.00	5.00	4.49	0.31	<0.001
	HIV Pregnant	20	5.00	6.30	5.48	0.55	
Total Antioxidant Status(mmol/L)	Pregnant	20	0.90	1.60	1.19	0.23	<0.001
	HIV Pregnant	20	0.60	1.00	0.90	0.13	

Table 8: Descriptive Statistics of Biochemical parameters in normal Pregnant and HIV-Pregnant women – based on socio-economic status.

Parameters	Females (All classes)	N	Min	Max	Mean	Std	P-value
Gluta.Reduction (Ug/HB)	Pregnant	100	3.0	6.0	4.37	0.79	<0.001
	HIV Pregnant	100	1.9	6.0	3.51	1.15	
Gluta.Peroxidase (Ug/HB)	Pregnant	100	20.0	31.0	27.17	2.76	<0.001
	HIV Pregnant	100	13.0	23.5	19.5	2.51	
SOD (Ug/HB)	Pregnant	100	600.0	1302.0	944.9	193.18	<0.001
	HIV Pregnant	100	400.0	908.0	675.3	125.93	

MDA (nmol/L)	Pregnant	100	4.0	5.2	4.50	.32	<0.001
	HIV Pregnant	100	4.5	6.3	5.46	.55	
Total Antioxidant Status(mmol/L)	Pregnant	100	.90	1.6	1.19	.20	<0.001
	HIV Pregnant	100	.50	1.0	.88	.15	

Table 8 shows that the activity of GR, GPx, SOD, MDA and total antioxidant in normal pregnant and HIV positive pregnant women. The activity in normal pregnant women were 4.37 ± 0.79 , 27.17 ± 2.76 , 944.9 ± 193.1 , 4.50 ± 0.32 , 1.19 ± 0.20 . And the activity was 3.51 ± 1.15 , 19.54 ± 2.51 , 675.3 ± 125.9 , 5.46 ± 0.55 , and 0.88 ± 0.15 found in HIV pregnant women. It shows that the level of antioxidant in HIV pregnant women was significantly decreased but MDA level was slightly increased found compare to non pregnant and normal pregnant women.

Socioeconomic status (SES) encompasses not just income but also educational attainment, financial security, and subjective perceptions of social status and social class. Socioeconomic status can encompass quality of life attributes as well as the opportunities and privileges afforded to people within society. Poverty, specifically, is not a single factor but rather is characterized by multiple physical and psychosocial stressors. Further, SES is a consistent and reliable predictor of a vast array of outcomes across the life span, including physical and psychological health. Thus, SES is relevant to all realms of behavioral and social science, including research, practice, education and advocacy. The Socioeconomic status has been considered as following items: woman and her spouse's education, woman and her spouse's occupation, income, their place of residence and number of people per household, value of per square meter of their house, facilities and leisure. The results suggest that, in this community, low socio-economic status as measured by the fathers' / husbands occupational status, is associated with a number of indicators of perinatal morbidity. Adjustment for the mothers' age, parity, marital status and weight/height reduces the magnitude and significance of the above differences as doe's further adjustment for indicators of the mothers' lifestyle.

Oxidative stress results from an imbalance between the generation of reactive oxygen and protective mechanisms. Free radicals, the main causes of oxidative stress, may react with variety of biomolecules including lipids, carbohydrates, proteins, nucleic acids and macromolecules of connective tissue. The oxidative stress is known to be a component of molecular and cellular tissue damage mechanisms in a wide spectrum of human diseases.

Antioxidant enzymes such as SOD, MDA, GPx, GR and total antioxidant can directly counterbalance the oxidant attack and protect the cells against DNA damage. SOD and MDA is a decisive antioxidant enzyme in aerobic cells, which is responsible for the elimination of superoxide radicals and it converts two toxic species: Superoxide and

hydrogen peroxide (H₂O₂) into water. This diminishes the toxic effects of superoxide radical and other radicals formed by secondary reactions. GR and GPx is a selenocysteine – dependent enzyme. GPx in cells is the most important hydrogen peroxide (H₂O₂) scavenging enzyme.^[12]

In the present study, it was found that there is significant increase of lipid peroxides in all the three trimesters. Since RBC has no nucleus, increased oxidative stress causes induction of antioxidant enzyme activities and this increase suggests a role of superoxide dismutase in the protection of embryonic development against free radical damage, which was observed by Carone et al^[13] But, Stephen Wisdom et al^[14] and Davidge et al^[15] found that there is reduced superoxide dismutase activity in the third trimester of normal pregnancy as compared to non-pregnant women. Behne^[16] and Pathak et al^[17] have shown that there is a progressive fall in the activity of plasma Glutathione peroxidase and superoxide dismutase as pregnancy advanced. Our study reveals similar findings, but the decrease of both superoxide dismutase and Glutathione peroxidase were statistically significant. Yu^[18] suggested that reduced glutathione is an effective reductant and plays an important role in a variety of detoxification processes. The enzyme Glutathione reductase plays a pivotal role in replenishing and maintaining optimum concentrations of reduced glutathione in biological systems. A gradual decrease in the activities of glutathione reductase and catalase throughout the three trimesters of pregnancy were observed in our study.

HIV/AIDS remains a significant development problem in India, and understanding the factors that can halt the spread of the disease is both an economic and a public health priority.

In this study found that higher socio-economic status was associated with the likelihood of HIV testing through VCT; that lower socio-economic status was associated with the likelihood of testing at integrated facilities; and that PMTCT and integrated testers were similar to non-testers and had lower levels of educational attainment compared with VCT testers. These results have implications for the implementation of programmes designed to ensure access to testing in low-resource settings.^[19] They suggest that provider-initiated modes of testing can increase uptake among socio-economically disadvantaged strata to a greater extent than traditional VCT at stand-alone facilities. Secondly, the lack of socio-economic differentials for PMTCT is consistent with the notion that expanding testing through PMTCT has reduced socio-economic obstacles for

women.^[20] It is important to develop comparable ways to reach men and address the gender dimension of HIV testing, which has been recognized in global documents. Thirdly, given low levels of testing worldwide and the persistence of socio-economic obstacles to the uptake of testing, continued efforts are needed to encourage testing among the less affluent through multiple means.

Conclusions/Significance

On the basis of our result concluded that the prevalence of HIV in India is low, the lack of strong wealth patterning in the risk of HIV suggests a more generalized distribution of HIV risk than some of India's high-risk group HIV prevention policies have assumed. The positive association between state economic development and individual risk for HIV is intriguing and requires further scrutiny. On the basis of our result we concluded that the HIV positive pregnant women experience more free radical injury than those with HIV negative pregnant women. Due to oxidative stress, when highly induce it is involved in tissue damage. These mechanisms lead to the decrease of the antioxidant capacity of the body in HIV positive pregnant women.

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