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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

RESEARCH ARTICLE

PREVALENCE AND CLINICAL PATTERN OF PEDIATRIC HIV INFECTION WITH TB, FTT AND PEM IN WEST BENGAL POPULATION- A CROSS SECTIONAL STUDY.

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Abstract

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Millions of people are living with HIV in the world and the number is increasing day by day. In India the number also grows rapidly. Infection of children with HIV means the inclusion of new cases with HIV is alarmingly high in India. The HIV prevalence rate in India is lower than in many other countries. In 2014, India's AIDS prevalence rate stood at approximately 0.26% — the 90th highest in the world.[6] The spread of HIV in India is primarily restricted to the southern and north-eastern regions of the country and India has also been praised for its extensive anti-AIDS campaign. The literature review revealed that the relation between malnutrition and pediatric HIV cases. In the current study, 104 patients were enrolled for the study in the tertiary care hospital in Kolkata to know the prevalence of pediatric HIV. For these purpose, prevalence of pediatric HIV cases were studied as sex distribution of the patient, age distribution, district wise distribution, distribution of weight for age, distribution for height for age and relation between HIV and most common pediatric problems like infection of tuberculosis, protein energy malnutrition and failure to thrive. Prevalence of HIV in the different groups, namely FTT, TB and PEM was found to be 2.27%, 2.94% and 3.9%, respectively, which was not different statistically (X^2= 0.248, p>0.5). In patients of TB only (no PEM and FTT) and PEM only (no TB and FTT), HIV prevalence was 6.25% and 8% respectively. 75% of the cases were suffering from PEM. Prevalence of PEM in TB patient was 52.9%. All the HIV positive cases in the study (n=4) were HIV1 positive. 95.74% patients were discharged from the study. So, the present study is opening a scope of further research to accurately delineate the correlation between HIV and gender encompassing a larger geographic region, and thus, including a larger population under review.

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Introduction:-

Worldwide, there were approximately 35.3 (32.2-38.8) million people living with HIV in 2012. While the national AIDS control organization estimated that 2.39 million people live with HIV/AIDS in India in 2008-2009, a more recent investigation by the Million Death Study Collaborators in the British Medical Journal (2010) estimated the population to be between 1.4-1.6 million people. Overall HIV prevalence at the state level shows that 60% HIV burden in India is in six high prevalence states like Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh, Manipur and Nagaland. The total number of people living with HIV and AIDS in India increased From 3,84-726 in December 2010 to 6, 04, 987 in December 2012. During the same period, West Bengal also noted a rise in population in pediatric patients and it almost double from 382 to 741(1, 2).

As a result of scaled-up HIV prevention services there was a 70% decline in the number of new HIV infections among children between 2000 and 2015. Despite this significant progress, the number of children becoming newly infected with HIV remains unacceptably high. About 150 000 [110 000–190 000] children became infected with HIV in 2015, down from 490 000 [430 000–560 000] in 2000. The risk of a mother living with HIV passing the virus to her child can be reduced to 5% or less if she has access to effective antiretroviral therapy during pregnancy, delivery and breastfeeding. In 2015, 77% [69–86%] of pregnant women living with HIV had access to medicines to prevent transmission to their infants (3-5).

Four hundred children become infected with HIV every day; however, In 2015, only 54% of children exposed to HIV in the 21 highest-burden countries were tested for the virus within the recommended two months. This is largely because it requires complex laboratory technology that is often only available at central laboratories. Also, results can take a long time to come back, which means that families do not always return for the results and never learn of a child's HIV status. Even though 2015 saw progress in the technology that can allow smaller clinics to conduct virological testing and to bring services closer to communities, it takes a while for this to happen as personnel have to be trained and facilities have to organize themselves (6-8).

According to Bunn and Karce, more than 50% patients admitted to many NRU are HIV positive. Study of Thrustans et al in Malawi found that there is a high prevalence (21.6%) of HIV infection in severally malnourished Malawian children attending nutritional rehabilitation clinic and suggested routine screening for HIV, in these patient emphasizing that their finding may have implication for other countries with similar pattern of childhood illness and food insecurity. National programs to address severe malnutrition in childhood have been largely separate from HIV/AIDS treatment and care initiative till date (9-12).

India faces similar type of relation with regards to malnutrition and food insecurity, it implies that India would be facing similar question regarding need for routine screening of HIV in patients of malnutrition as depicted in their setting. But data on HIV in our clinical setting is sparse with regard to the pediatric population in general as well as in specific clinical situations such as PEM and FTT (13, 14).

In the current study, 104 patients were enrolled for the study in the tertiary care hospital in Kolkata to know the prevalence of pediatric HIV. As Kolkata is the 3rd important city in India, the influx of different young people from various state of west Bengal is very common. For these purpose, prevalence of pediatric HIV cases were studied as distribution of sex in the patient, age distribution, district wise distribution, distribution of weight for age, distribution for height for age and relation between HIV and most common pediatric problems like infection of tuberculosis, protein energy malnutrition and failure to thrive.

Materials and Methods:-

The prospective observational study was done over a period of one year at Dr. B. C. Roy Post Graduate Institute of Pediatric Science, Kolkata which is a tertiary care pediatric hospital and teaching institute in Kolkata. All the patients in pediatric ward, newborn ward, sick neonatal care unit, neonatal intensive care unit and pediatric intensive care unit admitted with severe protein energy malnutrition, failure to thrive and tuberculosis were screened for the study. Clearance of institutional ethical committee was obtained and written informed consent from the parent and legal guardian of the patients were taken.

Data Collection:-
Data collection was done on admission of the patients, during the course of stay in the hospital and on follow-up. Data was collected utilizing specialized pro-forma, the case and document related to investigation. The details of patients were made anonymous by using a unique identifier code and then filled in a standardized form. These forms were then recorded in a computerized database (Microsoft Excel 2007 and SPSS 17.0.0).

Sample Design:-
Purposive consecutive sampling of all cases of failure to thrive (FTT), tuberculosis or severe protein energy malnutrition (PEM) were presenting in the hospital.

Sample size:-
101 cases were included in the present study. Depending on the attendance and past statistics of our hospital, a target to enroll 120 -130 patients was set at the beginning of the study. Total 101 children, who visited in the hospital for any reason and fitting into the inclusion criteria was taken into the studyand with proper care to exclude the patients with exclusion criteria.

Investigations, Procedure and Interventions:-
Informed consent was taken from every participant in the study. A detailed history and general physical examination of all the patients was done on admission, hospital stay and follow up. Detailed anthropomorphic examination was performed using suitable instruments. All children were subjected to routine blood investigations like CBC, Mantoux Test and Sputum for AFB was performed for appropriate group of patients. Depending on the age of the patients, the child or the mother underwent HIV Antibody Test for HIV 1 and HIV 2 by kit method. In case of children aged less than eighteen months, mother was screened for HIV and in case of children aged more than or equal to eighteen months, the child was screened for HIV.

Statistical Analysis:-
Analysis of the data was done using appropriate and suitable statistical method manually and using software including Microsoft Office Excel 2007 and SPSS Statistics 17.0. Ratio, proportions, percentages, measure of central tendency, measure of dispersion and standard error were used to analyze and express suitable data. Children characteristic were compared by HIV status using chi-square test and variant Fischer's Exact test for categorical variables, one sided and two sided test of significance were used. P-vales less than 0.05 were considered statistically significant.

Result and Analysis:-
Uptake of HIV testing was high with 101 (98.06%) out of 103 caregivers consenting to take part in the study. 7 patients (6.8%) were lost to follow up (LTFU). Data of 94 patients (91.26%) patients were analyzed.

Table-1:-Patients inclusion, exclusion, loss of follow up and final analysis.

Patients	Number (n)	Percentage (%)
Included (n)	103	100
No Consent (n)	02	1.94
LTFU	07	6.8
Final Analysis	94	91.26

Median age of the patients in the study was 27 months. Of these children, 26 (27.66%) were less than or equal to 12 months, 27 (28.72%) were aged 13 to 36 months, 13 (13.83%) were aged 37 to 60 months and 28 (29.79%) children were aged more than 60 months.

Table-2:-Distribution of cases in different age group.

Age Group	Case(n)	Cumulative Frequency	Case (%)
≤12 months	26	26	27.66
13 to 36 months	27	53	28.72
37 to 60 months	13	66	13.83
>60 months	28	94	29.79
Total	**94**		**100**

Total 101 children were included, of which 7 children (6 males and 1 female) were lost to follow up, hence only 94 children included for final analysis. Of these 94 children, 45 (47.9%) were male and 49 (52.1%) were female and the male: female ratio being 0.93:1.

Table-3:-Sex distribution in present study.

Sex	Case (n)	Case (%)
Male	45	47.9
Female	49	52.1
Total	94	100
Male: Female ratio	0.92:1	

Cases were included in the study if they satisfied criteria for TB, PEM and/or FTT. Of the total 4 cases found to be positive in the study, one satisfied criteria for TB only, two for PPM only and one for FTT and PEM. There is considerable overlap between all the cases which can be better understood by tabulating the data as below (Table-4).

Among the TB cases (n=34), which represent 36.17% patients in this study, one patients was HIV positive (2.94% TB cases). Of the 77 PEM patients, 3 (3.9%) were HIV positive. 2.27% (one case) of FTT patients (n=44) were HIV positive. When exclusively PEM cases were taken with exclusion of TB and FTT, among 25 such patients, 2 were HIV positive i.e. 8% cases.

Table-4:-Prevalence of HIV in different Category of Patients.

Category	Number(n)	Number (%)	HIV(+Ve)[*]	HIV(-Ve)[**]	Prevalence (%)
TB	34	36.17	1	33	2.94
PEM	77	81.96	3	74	3.9
FTT	44	46.80	1	43	2.27
TB and FTT but no PEM	1	1.06	0	1	0
TB and PEM but no FTT	9	9.57	0	9	0
PEM and FTT but no TB	35	37.23	1	34	2.86
TB and FTT	9	9.57	0	9	0
TB and PEM	17	18.09	0	17	0
PEM and FTT	43	45.74	1	42	2.33
TB and PEM and FTT	8	8.51	0	8	0
TB or PEM	94	100	4	90	4.26
TB or FTT	69	73.40	2	67	2.9
PEM or FTT	78	82.98	3	75	3.85
TB or PEM or FTT	94	100	4	90	4.26

*(+Ve)= Positive, **(-Ve)=Negative

To test the significance of such result, chi square test was performed using SPSS software. The difference in HIV status of the different groups included in the study is not significant statistically. The cross tabulation of Inclusion verses HIV status and the Chi-Square test result of Inclusion verses HIV status was clearly depicted in Table-5 and Table-6.

Table-5:-Cross Tabulation of Inclusion verses HIV Status.

			HIV Status		Total
			HIV (-Ve)*	HIV (+Ve)**	
Inclusion	FTT	Count	43	1	44
		% Within Inclusion	97.7%	2.3%	100%
		% within HIV Status	28.7%	20.0%	28.4%
	PEM	Count	74	3	77
		% Within Inclusion	96.1%	3.9%	100%
		% within HIV Status	49.3%	60.0%	49.7%

	TB	Count	33	1	34
		% Within Inclusion	97.1%	2.9%	100%
		% within HIV Status	22.0%	20.0%	21.9%
Total		Count	150	5	155
		% Within Inclusion	96.8%	3.2%	100
		% within HIV Status	100%	100%	100%

Table-6:-Chi-Square Test Result of Inclusion verses HIV Status.

	Value	df	Asymp. Sig. (2 sided)
Person Chi-squre	0.248	2	0.884
Likelihood Ratio	0.256	2	0.880
N of valid case			155
The minimum expected count is 1.10, X^2=0.248,p>0.5 Not Significant			

The relation between the HIV status and Sex was determined in this study. The result shows that, in overall, 4.3% of the children in this study were HIV positive. No case was found in a female. 8.9% of males were found to be HIV positive which is statistically significant (Fischer Exact Test, p=0.049). The cross tabulation of Sex verses HIV status and the Chi-Square test result of Sex verses HIV status was clearly depicted in Table-7 and Table-8.

Table-7:- Cross Tabulation of Sex verses HIV Status.

			HIV Status		Total
			HIV (-Ve)*	**HIV (+Ve)****	
Sex	Female	Count	49	0	49
		% Within Sex	100%	0%	100%
		% within HIV Status	54.4%	0%	52.1%
	Male	Count	41	4	45
		% Within Sex	91.1%	8.9%	100%
		% within HIV Status	45.6%	100%	47.9%
Total		Count	90	4	94
		% Within Sex	95.7%	4.3%	100%
		% within HIV Status	100%	100%	100%

Table-6:- Chi-Square Test Result of Sex verses HIV Status.

	Value	df	Asymp. Sig. (2 sided)	Exact. Sig. (2 sided)	Exact. Sig. (1sided)
Person Chi-squre	4.549	1	0.033		
Likelihood Ratio	6.087	1	0.014		
Continuity Correction	2.629	1	0.105		
Fischer Exact Test				0.049	0.049
Linear by linear association	4.501	1	0.034		
N of valid case			94		
The minimum expected count is 1.91, X^2=4.549,p=0.049, Significant					

Out of 94 patients in the study, 23 (24.5%) patients were from Category A district. Among them 3 (13.0%) were positive for HIV and 20 (86.7%) were HIV negative. 17 (74.5%) cases were from Category C districts out of the total 94 (100%) in the study. One patient (1.4%) tested positive and 70 (98.6%) were HIV negative. No cases were enrolled in the study from Category B and Category D districts. HIV status (number and percentage) in different districts of West Bengal was tabulated in Table-7 and the district category verses HIV status cross tabulation and chi square test result were clearly depicted in Table-8 and Table-9 respectively. According to the NACO, different categorization of district was tabulated in Table-10.

Table-7:-HIV status (number and Percentage) observed in different districts in WB.

District	Total Cases (n)	HIV Positive	HIV Positive (%)
Howrah	6	0	0
Hoogli	1	0	0
Kolkata	23	3	75%
North 24 parganas	39	1	25%
South 24 parganas	16	0	0
Nadia	8	0	0
Maldah	1	0	0

Table-8:-Cross Tabulation of District Category verses HIV Status.

			HIV Status		Total
			HIV (-Ve)*	HIV (+Ve)**	
District Category	Category-A	Count	20	3	23
		% Within District Category	87.0%	13.0%	100%
		% within HIV Status	22.2%	75.0%	24.5%
	Category-C	Count	70	1	71
		% Within District Category	98.6%	1.4%	100%
		% within HIV Status	77.8%	25.0%	75.5%
Total		Count	90	4	94
		% Within District Category	95.7%	4.3%	100%
		% within HIV Status	100%	100%	100%

Table-9:-Chi-Square Test Result of District Category verses HIV Status.

	Value	df	Asymp. Sig. (2 sided)	Exact. Sig. (2 sided)	Exact. Sig. (1sided)
Person Chi-squre	5.772	1	0.016		
Likelihood Ratio	4.760	1	0.029		
Continuity Correction	3.270	1	0.071		
Fischer Exact Test				0.044	0.044
N of valid case	94				
The minimum expected count is 1.91, X^2=5.772,p=0.044					
Significant difference between rates of HIV in Category A districts compare to Category C					

Table-10:-Classification Criteria of Districts Category.

Category	Characteristics
A	More than 1% ANC prevalence in district in any of the sites in the last 3 years
B	Less than 1% ANC prevalence in all the sites during last 3 years with more than 5% prevalence in any HRG site (STD/FSW/MSM/IDU)
C	Less than 1% ANC prevalence in all sites during last 3 years with less than 5% in all HRG sites, with known hot spots (Migrants, truckers, large aggregation of factory workers, tourist etc)
D	Less than 1% ANC prevalence in all sites during last 3 years with less than 5% in all HRG sites with no known hot spots OR no or poor HIV data
ANC: Ante-natal Clinic; HRG: High Risk Group; STD: Sexually Transmitted Disease; FSW: Female Sex Worker; MSM: Men who have Sex with Men; IDU: Injecting Drug User	

Discussion:-

The present prospective observational study was conducted with an aim to know the prevalence of Human deficiency Virus (HIV) infection among the admitted children suffering from tuberculosis, failure to thrive and severe protein energy malnutrition in a tertiary care pediatric hospital.

In the present study, uptake of HIV testing was high (98.06%) median age of the patients was 27 months, with 26 (27.66%) patients less than or equal 12 months, 27 (28.72%) aged 13 to 36 months, 13 (13.83%) aged 37 to 60 months and 28 (29.79%) children aged more than 60 months. 47.9% (n=45) were males and 52.1% (n=49) were females with no significance difference (Z=0.41294, p=0.339824). Cases belong to seven districts of west Bengal but patients from Kolkata and the adjoining districts of North 24 parganas and south 24 parganas represent 82.95 % (n=78) of the total patients in the study. 4.3 % (n=4) of the children in this study were HIV positive, who were all males (8.9% of males) which is statistically significant (Fischer Excet Test, p=0.049). According to NACO (National Aids Control Programme) categorization of district, 13.0%(n=3) patients in Category A district and 1.4% (n=1) patients in Category C district were HIV positive and the difference is statistically significant (Fisher's Exact Test, p=0.044). Prevalence of TB, PEM and FTT in Kolkata was 13.04% which is statistically significant.

Prevalence of HIV in the different groups, namely FTT, TB and PEM was found to be 2.27%, 2.94% and 3.9%, respectively, which was not different statistically (X^2= 0.248, p>0.5). In patients of TB only (no PEM and FTT) and PEM only (no TB and FTT), HIV prevalence was 6.25% and 8% respectively. 75% of the cases were suffering from PEM. Prevalence of PEM in TB patient was 52.9%. All the HIV positive cases in the study (n=4) were HIV1 positive. 95.74% patients were discharged from the study. Among the HIV positive cases, 3 (75%) were referred where as there was death of one patient.

There are two limitation of our study. One the present study is a single hospital study, secondly, due to resource and availability constraints to conduct virological assay, HIV status of mother was decidedly taken at surrogate marker of HIV positivity in the child less than 18 months of age.

We conclude that health care providers must be protective in testing and counseling for HIV. HIV screening of all patients of TB, severe PPM and FTT is strongly recommended in patients from Kolkata. In our demographic setting, it will be imprudent and cost ineffective to carry out routine screening for HIV in all case of severe PEM except, perhaps, those from Kolkata. There is paucity of literature on the prevalence of HIV in cases of FTT. Hence, more studies are needed on this subject. The prevalence from our study can be taken as a reference for minimum sample size calculation for such kind of study. A study similar to the present study need to be conducted in a multi-centric fashion, to be able to generalized the result to the entire state of West Bengal, India. Further research need to be conducted to look into the socio cultural correlates of TB, FTT and PEM together and individually, specific in the districts of Kolkata, north 24 parganas and south 24 parganas. There is a scope of further research to accurately delineate the correlation between HIV and gender encompassing a larger geographic region, and thus, including a larger population under review. Studies should be done at dedicated TB treatment centers (DOTS centers) and HIV treatment centers (ICTC) to record the trends of HIV in TB and vice versa.

Competing Interests Statement:-
The authors declare that they have no competing interests

Ethics Approval:-
Present study was approved by the institutional ethical committee.

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