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Clinical and Immunologic Profile of Human Immunodeficiency Virus Infection In Children Diagnosed Using Provider-Initiated Testing And Counseling Strategy In Ido-Ekiti, Nigeria: A Cross-Sectional Study"

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***Abstract**: **Background:** Most children with HIV infection are not on antiretroviral drugs because their HIV status are not known. Provider-Initiated Testing and Counselling strategy aims at bridging this gap. The purpose of the present study was to determine the clinical and immunologic profile of HIV infection at presentation in the children detected to have HIV infection using PITC Strategy. **Method:**A hospital-based cross-sectional study. Consecutive new patients from birth to age of 15 years with unknown HIV sero-status who presented at the Paediatric Emergency Unit of FMC, Ido-Ekiti during the study period were offered HIV testing using PITC strategy.All the patients were clinically evaluated before the HIV test was done. Patients were examined for signs of HIV infectionbased on the revised WHO Paediatric Clinical Staging of HIV/AIDS Disease. **Results:** Common symptoms in children with HIV infection were fever, diarrhoea, fast breathing, cough, and poor weight gain/failure andcommon signs in patients with HIV infection were pallor, oral thrush, generalized lymphadenopathy, otorrhoea, hepatomegaly, splenomegaly and skin lesions. Only the presence of poor weight gain and generalised lymphadenopathy were independent predictors of HIV infection ($p < 0.006$).Twelve (50%) of the 24 patients with HIV infection presented in clinical stage 3 with another two (8.3%) in stage 4. Three (12.5%) of the patients were however in clinical stage 1. Twelve (50%) of the patients were severely immuno-suppressed and six (25.0%) were without significant immunodeficiency. **Conclusion:**HIV in children in Ido-Ekiti occurs and most cases presented with severe disease. Improved access to prevention services and early diagnosis are recommended.*

***Keywords:** PITC strategy, Clinical features of HIV, Children Emergency Unit*

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I. Background

Human Immunodeficiency Virus causes chronic multisystem disease with varied clinical manifestations in children. Clinical manifestations vary from an asymptomatic state without significant immune suppression to a condition characterized by a constellation of conditions and infections associated with the serious immune deficiency state defined as Acquired Immune Deficiency Syndrome (AIDS). [1]

Growth faltering is one of the early manifestations of HIV infection in children. A prospective study by Bakaki*et al*[1]that comparedgroups of HIV-infected and HIV-uninfected infants younger than 18 months showed that the mean Z-scores for weight-for-height, weight-for-age and height-for-age among Ugandan children with HIV infection were statistically significantly lower than those of children without HIV infection. The study by Adejuyigbe *et al*[2]which prospectively screened children aged three days to 17 years who presented in their hospital with features of immunosuppression for HIV infection also found failure to thrive to be highly predictive of HIV infection. Generalized lymphadenopathy was found in all paediatric HIV infected patients studied in Calabar, and Kinshasa, while it was found in 50% of studied paediatric patients in Enugu.[3-5]

Recurrent diarrhoea has been found to predominate in developing countries.Akpede*et al*,[6] Bakaki*et al*,[1]Mugang*aet al*, [7]and Emodi*et al*,[8]reported it in their series. Also, researchers in developing countries

have consistently reported high prevalence of respiratory tract infection in HIV infected children.[1, 2, 6, 8]Respiratory infections include bronchopneumonia, pulmonary tuberculosis and *Pneumocystis jiroveci* pneumonia. Dermatological conditions were also highlighted in the series by Bakaki*et al*,[1]Emodi*et al*[8]and Adejuyigbe *et al.*[2]

Bakaki*et al*[1]observed that oral thrush was more common among Ugandan children aged less than 18 months. Adejuyigbe *et al*,[2]Emodi*et* al,[8] and Ugochukwu*et al*[9]also reported it in their series. Recurrent bacterial infections have been reported to be common in HIV infected children in the series by Adejuyigbe *et al*,[2]Oniyangi*et al*,[10]Angyo*et al*,[11]Akpede*et al*,[6]and Ojukwu*et al*.[12]

The appearance of a combination of these conditions or their re-occurrence in an individual child should raise the suspicion of HIV infection. Karande*et al*[13] demonstrated that the presence of severe malnutrition, disseminated tuberculosis, chronic diarrhoea, oral candidiasis and pyogenic infections such as pneumonia either singly or in combinations in a child, had high sensitivity in predicting HIV infection.Akpede*et* al[6] also reported tuberculosis, malnutrition, gastroenteritis and multiple clinical diagnoses as being associated with HIV seropositivity. In the series by Adejuyigbe *et al*[2], weight loss or failure to thrive, persistent diarrhoea and skin disorders were found to be sensitive and specific with high positive predictive value for HIV infection.
In spite of the fact that early initiation of antiretroviral therapy improves the health of children with HIV infection, most children with HIV infection are not on antiretroviral drugs because their HIV status are not known.[14, 15]This formed the basis of Provider-Initiated testing and counselling strategy in order to increase access to care of people that are HIV infected or exposed to care and management. The purpose of the present study was to determine the clinical and immunologic profile of HIV infection at presentation in the children detected to have HIV infection using PITC Strategy.

II. Methods

Study design

The study was a hospital-based, descriptive, andcross-sectional.

Study setting

The study was carried out between April to September 2012 at the Paediatric Emergency Unit of FMC, Ido-Ekiti. The centre is a tertiary hospital that serves as a referral centre for the neighbouring towns in Ekiti State and neighbouring Ondo, Osun and Kwara States. Human Immunodeficiency Virus-exposed and children with HIV infection are seen, investigated, managed and followed-up at the Paediatric Infectious Disease Control Clinic.

Study participants

The subjects were consecutive new paediatric patients with unknown HIV sero-status, aged 0-15 years who presented in the PEU with any illness. The patients were recruited after signing or thumb-printing an informed consent form by the parents/caregivers. The assent of the patients who were seven years and older was sought by explaining the purpose of the study and details of the sample collection to them in a manner they would understand. Patients with documented HIV status at presentation were excluded from the study. Each patient was recruited once until the desired sample size was attained.

Sample size determination: The minimum sample size required for the study was determined using the formula: $n = z^2 p (1-p) \div d^2$[16]. P = 0.5 (no similar study had been done in the region); d = 0.05. Thus, the estimated minimum sample size was 385. However, a total of five hundred and thirty patients were however tested for HIV infection using PITC strategy.

Data Collection

Caregivers and patients were given HIV pre-test counselling using WHO guideline on PITC with the choice of "opting out". [17] Assent was obtained from children aged seven years and above. Pre-test and post-test information was provided in the individual sessions. An interviewer-administered questionnaire designed for the study was used to record information from each caregiver.

Data Analysis

The data were entered into a personal microcomputer and analysed using the software, Statistical Package for Social Sciences (SPSS) for Windows, version 15.0. Categorical variables were expressed in proportions, ratios and percentages, while statistical test was done using Chi-square (χ^2) test. Statistical significance was set at 'p' value less than 0.05.

Ethical consideration

Institutional Ethical Approval was obtained from the Ethics and Research Committee of FMC, Ido-Ekiti. A written informed consent form detailing the study purpose, benefit, and possible risks to participants and their caregivers was duly signed by each caregiver. In addition, assent was obtained from children aged seven years and above who were in stable clinical condition.

III. Results

A total of 530 patients were screened for HIV infection. They consisted of 296 (55.8%) males and 234 (44.2%). The ages of the patients ranged between one day and 180 months, with a median age of 14 months.
Table 1 compares presenting symptoms between patients with and without HIV infection. A significantly higher proportion of patients with HIV infection had fever, cough, diarrhoea, fast breathing and weight loss/poor weight at presentation compared with patients without HIVinfection. This was followed by cough which occurred in 11 (45.8%) of patients with HIV infection and 137 (27.1%) without HIV infection.

Logistic regression analysis of the presenting symptoms in relation to HIV infection status after controlling for other confounding symptoms showed only weight loss/poor weight gain to be predictive of HIV infection.

The prevalence rates of the clinical signs were compared between patients with HIV infection and patients without HIV infection in Table 2. Generalized lymphadenopathy, pallor, hepatomegaly, splenomegaly, skin lesions, oral thrush and otorrhoea were observed in a statistically significantly higher proportion of the patients with HIV infection. Though parotid fullness was observed in only one (4.2%) of the patients with HIV infection and none (0.0%) of 506 patients without HIV infection, the difference was statistically significant (χ^2 = 4.792; df = 1; p = 0.029 with Yates correction).

Logistic regression analysis of the presenting signs in relation to HIV infection status after controlling for other confounding symptoms showed only generalized lymphadenopathy to be predictive of HIV infection.
Table 3 shows the comparison of prevalence of moderate and severe malnutrition between patients with and without HIV infection. The Z-scores of weight-for-length/height (WHZ), length/height-for-age (HAZ) and weight-for-age (WAZ) were all lower in patients with HIV infection than without HIV infection; however, the difference was not statistically significantly different for length/height-for-age. The prevalence rates of severe malnutrition using Z-scores of weight-for-length/height (WHZ), length/height-for-age (HAZ) and weight-for-age (WAZ) were higher when patients with HIV infection when compared with patients without HIV infection; however, the difference was not significantly significant for weight-for-length/height (Z = 1.10; p = 0.269).
Table 4 shows the comparison of frequency of the various clinical diagnoses between patients with and without HIV infection. All the diagnoses were common in patients with HIV infection except pyrexia of undetermined origin (PUO), acute uncomplicated malaria and acute tonsillo-pharyngitis.

The clinical stages of HIV infection based on revised WHO paediatric clinical staging of HIV/AIDS disease andimmunological categories of patients with HIV infection based on WHO (2006) classification of HIV-associated immunodeficiency of the patients with HIV infection is presented in Table 5. Twelve (50%) of the 24 patients with HIV infection presented in clinical stage 3 with another two (8.3%) in stage 4. Three (12.5%) of the patients were however in clinical stage 1. The Twelve (50%) of the patients were severely immuno-suppressed and six (25.0%) were without significant immunodeficiency.

Analysis using spearman correlation showed a strong positive correlation between the clinical staging and the immune status of the patient. The more advanced the clinical stage of HIV infection was, the more the severity of the immune status (rho = 0.713; n = 24; p < 0.001).

Table 6 gives the details of the analysis of the outcome in the two groups. A total of 351 (66.2%) of the 530 patients were admitted due to the severity of the primary illness; comprising 23 (95.8%) of 24 patients with HIV infection and 328 (64.8%) of 506 patients without HIV infection. None (0.0%) of the patients with HIV infection and seven (2.2%) of the patients without HIV infection took discharge against medical advice (DAMA). Twenty-nine (8.4%) of the remaining 344 patients died; giving an overall mortality rate of 8.3%. The overall mortality rates in the two groups were however very similar (χ^2 = 0.000; p = 1.0).

IV. Discussion

The clinical features in patients with HIV infection varies with the degree of immune-suppression. The symptoms that were more common in patients with HIV infection in the present study were fever, diarrhoea, cough, weight loss/ poor weight gain, fast breathing, and ear discharge. These symptoms were similar to those from other studies in Nigeria though there were variations in their frequencies. Emodi et al [8] in the series from Enugu reported that fever, cough and weight loss were more common while Oniyangi*et al*[10]reported that fever, diarrhoea and fast breathing were more common in the patients with HIV infection. On the other hand,Ugochukwu*et al*[9] reported that weight loss was the most common symptom being present in all the patients with HIV infection. In the present study seizures was less common in patients with HIV infection compared with those without HIV infection, though the difference was not statistically significant. The rarity of neurological features had earlier been reported by Emodi*et al*.[8] This might not be unrelated to the relatively long time required for neurological features to develop and so the neurological presentations of HIV infection are therefore rare in patients.

The common signs in patients with HIV infection in the present study were generalized lymphadenopathy, pallor, hepatomegaly, splenomegaly, oral thrush, and skin infections. Generalized

lymphadenopathy has been recognized in various studies as one of the cardinal signs of HIV infection in patients. Ugochukwu*et al*[9] and Emodi*et al*[8]reported its presence in 83.3% and 59% of their series respectively. The finding of generalized lymphadenopathy of 95.8% in the present study was higher than the findings by Ugochukwu*et al*[9] of 83.3% and much higher than 59% reported by Emordi*et al*. [8]

Bakaki*et al*[1] found parotid enlargement as being significantly more common in patients older than 18 months with HIV infection. Notably the only patient in the present series with parotid fullness was older than 18 months and had HIV infection. This may therefore be a reliable diagnostic sign of HIV infection in the older patients.

Logistic regression analysis of the symptoms and signs after correcting for other confounding factors in the present study revealed that weight loss or poor weight gain and generalized lymphadenopathy occurring in an individual patient could predict the presence of HIV infection. This compares with the report of Prazuck*et al*[18] which showed that generalized lymphadenopathy was the strongest indicator of HIV infection in their study. Adejuyigbe *et al*[2] reported weight loss or failure to gain weight as highly sensitive and specific with high positive predictive value in predicting HIV infection. Thus the presence of weight loss or poor weight gain and/ or generalized lymphadenopathy in a child should heighten the index of suspicion for HIV infection.

Frequently identified morbidities in patients with HIV infection are similar to that in patients without HIV infection although often more frequent and more severe. [19]Pulmonary infections has been identified as a major cause of morbidity and mortality in patients with HIV infection. [19] The cause of pneumonia among patients with HIV infection is usually a challenge due to the diagnostic limitation posed by Pneumocystis pneumonia and tuberculosis. At best their diagnosis depends on the clinical assessment of the attending physician. In the present study, nine (37.5%) of the patients with HIV infection had features of pneumonia at presentation. One (4.2%) of the patients with HIV infection had tuberculosis co-infection. Bakaki*et al*[1] reported pneumonia in 39% and pulmonary tuberculosis in 14.7% of patients with HIV infection. Oniyangi*et al*[10] reported pneumonia in 60.5% of HIV infected patients in Abuja and 15.6% of patients with HIV had tuberculosis co-infection in Enugu.

In the absence of antiretroviral therapy, HIV infection in patients is associated with a rapid progression to AIDS and a high mortality rate. In the present study, overall mortality rate of the study population was 8.4% among patients that were admitted, with slightly higher mortality rate of 8.7% among patients with HIV infection. These were deaths within the admission period only.Studies have shown that mortality is consistently higher amongst patients admitted to hospital with HIV infection compared with those without HIV infection. High mortality figures of 26.1-46.3% have been reported from other parts of Nigeria.[2, 10, 11] In a prospective five-year study of Rwandan patients with HIV infection, the estimated risk of death at 2 and 5 years of age was 45% and 62%, respectively and the risk of dying was 21 times higher than in patients without HIV infection.[20] These high mortality figures were in the pre-antiretroviral era and so the lower mortality rate observed in the present study could have been due to the antiretroviral treatment programme in place at the study centre which facilitated the management of these patients and thus gave a better outcome. This reason may also have accounted for none of the patients with HIV infection taking discharge against medical advice as observed in the present study compared with reports from pre-antiretroviral era.[2, 6, 10, 11]

Strong association has been shown between poor growth and mortality in patients with HIV infection. [20] The two patients with HIV infection that died were severely malnourished. The mortality data in the present study however had to be interpreted with caution because it involved a relatively small number of patients.

Patients with untreated HIV-1 infection usuallyprogress rapidly to AIDS. [1] Using the revised WHO Paediatric Clinical Staging of HIV/AIDS Disease, half of the patients with HIV infection in the present study presented in advanced clinical stage while close to 10% had severe clinical stage. Moreover, half of the patients with HIV infection had severe immune-suppression while over 20% had advanced immunodeficiency. Ugochukwu*et al* [9]observed that over 80% of their patients presented with WHO clinical stage 3 disease, and close to 60% were severely immune-suppressed. Similar figure of severe immune-suppression was reported by Adejuyigbe *et al*.[2] This emphasizes the fact that HIV infection progresses rapidly in the majority of paediatric patients with HIV infection and that most patients with HIV infection will present at the advanced stage of the disease usually associated with poor prognosis and need for antiretroviral therapy. There is thus a need to evolve methods of early identification and proper management of patients with HIV infection to prevent clinical and immunological deterioration. About a third of the patients with HIV infection in the present study had no significant immune-suppression to mild immune-suppression. This showed an advantage of routine offering of HIV testing to the paediatric patients in clinical settings using the PITC Strategy.

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Clinical suspicion-based screening even though important was noted to provide a relatively under-utilized opportunity for detection of new cases and detects mainly advanced cases from reports on adult population necessitating the need for newer strategy for HIV screening like PITC Strategy which when instituted in adult population picked them at earlier stages of their disease. From the findings in the present study, majority of the patients with HIV infection that were detected using PITC Strategy were in clinical stage 3 and severely immune-deficient. This may be a reflection of the documented fact that HIV infection in children rapidly progresses more than that in adults.[1]

Though PITC Strategy did not detect a high proportion of patients with HIV infection in the early stages in the present study, this is perhaps because these were ill patients. It is believed that the PITC Strategy will also be another way of early detection and linking mothers with HIV infection to HIV treatment programmes in order to institute PMTCT early for subsequent pregnancies. The potential of properly informing the populace on progress in HIV management and outcome may eventually lead to reduction in stigmatization which is common among patients living with HIV/AIDS.

V. Conclusion

Most patients presented in advanced clinical and immunological stages of the disease. Children with HIV infection without clinical features suggestive of immune suppression were identified during the study emphasising the advantage of PITC model adopted in acute paediatric care facilities. Though the common clinical features that included pallor, oral thrush,diarrhoea, weight loss/ poor weight gain,generalized lymphadenopathy, and skin lesionswere similarin children with and without HIV infection; they were more frequent in patients with HIV infection.

Authors' Contributions

OTB: Study conceptualization, data collection and analysis, manuscript writing

LSB: Involved in the data analysis and manuscript writing

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Table 1: Comparison of presenting symptoms in patients with and without HIV infection.

Symptom	Number (%) with HIV infection n = 24	Number (%) without HIV infection n = 506	Total (%) n = 530	*OR (95% CI)*	*p* Value
Fever	23 (95.8)	286 (56.5)	309 (58.3)	18 (2.37,132.02)	0.002*
Diarrhea	13 (54.2)	43 (8.5)	56 (10.6)	13 (5.38,30.12)	0.001*
Cough	11 (45.8)	137 (27.1)	148 (27.9)	2.3 (0.99-5.20)	0.026*
Fast/difficult breathing	9 (37.5)	62 (12.3)	71 (13.4)	4.3 (1.80,10.23)	0.006*
Weight loss/poor weight gain	10 (41.7)	18 (3.6)	28 (5.3)	19 (7.58,49.48)	0.000*
Seizures	2 (8.3)	64 (12.6)	66 (12.5)	0.6 (0.14,2.73)	0.942
Loss of consciousness	1 (4.2)	19 (3.8)	20 (3.8)	1.1 (0.14,8.69)	1.000
Ear discharge	3 (12.5)	25 (4.9)	28 (5.3)	2.7 (0.77,9.83)	0.455

****Some of these patients presented with more than one symptom.**

Table 2: Comparison of clinical signs in patients in relation to their HIV infection status.

Clinical sign	Number (%) with HIV infection n = 24	Number (%) without HIV infection n = 506	Total Number (%) of patients n = 530	*OR (95% CI)*	*p* Value
Pallor	19 (79.2)	113 (22.3)	132 (24.9)	13.22(4.83,36.18)	0.001
Jaundice	1 (4.2)	57 (11.3)	58 (10.9)	0.34 (0.05,2.58)	0.451*
Oral thrush	6 (25.0)	3 (0.6)	9 (1.7)	55.89(12.93,241.50)	0.000
Generalised lymphadenopathy	23 (95.8)	29 (5.7)	52 (9.8)	378.31(49.34,2900.56)	0.000
Parotid fullness	1 (4.2)	0 (0.0)	1 (0.2)		0.029*
Otorrhea	3 (12.5)	11 (2.2)	14 (2.6)	6.43 (1.67,24.78)	0.000*
Skin lesions**	12 (50.0)	38 (7.5)	50 (9.4)	12.32 (5.18,29.27)	0.000
Hepatomegaly	18 (75.0)	225 (44.5)	243 (45.8)	3.75 (1.46,9.60)	0.035
Splenomegaly	15 (62.5)	52 (10.3)	67 (12.6)	14.55 (6.07,34.9)	0.000
Crepitation	2 (8.3)	39 (7.7)	41 (7.7)	1.09 (0.25, 4.80)	1.000*

***With Yates's correction**

****Impetigo, papularurticaria, plana warts, seborrhoeic dermatitis, Tinea**

Table 3: Comparison of prevalence of moderate and severe malnutrition between patients with and without HIV infection.

Nutritional status (Z-score)	Number (%) with HIV infection n = 24	Number (%) without HIV infection n = 506	Total (%) n = 530	*Z* test	*p* Value
Moderate					
WHZ <-2	14 (58.3)	138 (27.3)	152 (28.7)	3.05	0.002
HAZ <-2	15 (62.5)	210 (41.5)	225 (42.5)	1.82	0.068
WAZ <-2	17 (70.8)	197 (38.9)	214 (40.4)	2.90	0.004
Severe					
WHZ <-3	2 (8.3)	12 (2.4)	14 (2.6)	1.10	0.269
HAZ <-3	7 (29.2)	35 (6.9)	42 (7.9)	3.57	0.000
WAZ <-3	5 (20.8)	22 (4.4)	27 (5.1)	3.08	0.002

Table 4: Comparison of the frequency of clinical diagnoses between patients with and without HIV infection.

Clinical Diagnosis	Number (%) patients with HIV infection n = 24	Number (%) patients without HIV infection n = 506	Total number (%) n = 530	*OR (95% CI)*	*pValue*
Pneumonia	9 (37.5)	37 (7.3)	46 (8.7)	7.60(3.12,18.55)	0.000
Suppurative otitis media	3 (12.5)	25 (4.9)	28 (5.3)	2.75 (0.77,9.83)	0.453
PTB	1 (4.2)	5 (1.0)	6 (1.1)	4.36(0.49,38.82)	0.559
Severe malaria with severe anaemia	3 (12.5)	47 (9.3)	50 (9.4)	1.40 (0.40,4.85)	0.964
PEM	22 (91.7)	219 (43.3)	241 (45.5)	14.42(3.35,61.96)	0.000
Failure to thrive	1 (4.2)	13 (2.6)	14 (2.6)	1.65(0.21,13.15)	0.973
Acute diarrhoea disease	13 (54.2)	49 (9.7)	62 (11.7)	11.02(4.69,25.93)	0.000
PUO	3 (12.5)	65 (12.8)	68 (12.8)	0.97 (0.28,3.34)	1.000
Acute uncomplicated malaria	1 (4.2)	109 (21.5)	110 (20.8)	0.16 (0.02,1.19)	0.240
Pyomyositis	2 (8.3)	12 (2.4)	14 (2.6)	3.74 (0.79,17.75)	0.367
Acute TP	1 (4.2)	35 (6.9)	36 (6.8)	0.59 (0.076,4.46)	0.965
Partially treated meningitis	2 (8.3)	3 (0.6)	5 (1.0)	15.24(2.42,95.92)	0.002
Oral Candidiasis	6 (25.0)	3 (0.6)	9 (1.7)	55.89(12.93,241.50)	0.000
Dermatosis*	12 (50.0)	38 (7.5)	50 (9.4)	12.32(5.18,29.27)	0.000

Acute TP = Acute tonsillopharyngitis; PUO = pyrexia of undetermined origin; PTB = Pulmonary tuberculosis; PEM = Protein energy malnutrition. *Impetigo, papularurticaria, plana warts, seborrhoeic dermatitis, Tinea

Table 5: Clinical and immunologic stages of the patients with HIV infection according to revised WHO paediatric clinical and immunologic staging of HIV/AIDS disease.

Staging	Frequency (%) n=24
Clinical stage	
Stage 1 asymptomatic	3 (12.5)
Stage 2 mild	7 (29.2)
Stage 3 advanced	12 (50.0)
Stage 4 severe	2 (8.3)
Immunologic category	
No significant immunodeficiency	6 (25.0)
Mild immunodeficiency	1 (4.2)
Advance immune-deficient	5 (20.8)
Severe immunodeficiency	12 (50.0)

Table 6: Outcome among the 351 patients tested that wereadmitted in relation to their HIV status.

Outcome	**Number (%) with HIV infection n = 23**	**Number (%) without HIV infection n = 328**	**Total (%) n = 351**	***p* Value**
Survived	21 (91.3)	294 (89.6)	315 (89.7)	*$X^2 = 0.000$;*
Died	2 (8.7)	27 (8.2)	29 (8.3)	*P = 1.0*
DAMA	0 (0.0)	7 (2.2)	7 (2.0)	
Total	23 (100.0)	328 (100.0)	351 (100.0)	

Dr.OluwaseyiTosinBabatunde "Clinical and Immunologic Profile of Human Immunodeficiency Virus Infection In Children Diagnosed Using Provider-Initiated Testing And Counseling Strategy In Ido-Ekiti, Nigeria: A Cross-Sectional Study"."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 3, 2018, pp 61-67.