ABSTRACT

BACKGROUND

HIV/AIDS is one of the most leading challenges for world public health. It was first identified in United States nearly two decades ago. The majority of HIV and AIDS cases appear in sub Saharan Africa. Adult HIV prevalence in India declined from 0.41% in 2000 to 0.31% in 2009.

OBJECTIVE

The proposed study is planned to find suitable statistical distribution for data regarding HIV/AIDS.

SPECIFIC

(1) To demonstrate the application of weibull distribution in the field of HIV incubation time data.

(2) To find suitable distribution for the incubation time data of HIV/AIDS.

(3) To evaluate the characterization properties, asymmetry, skewness and kurtosis of the suitable identified distribution.

(4) To predict the number of cumulative number of AIDS cases with Back Calculation Model using incubation time distribution

(5) To predict the number of HIV cases using curve fitting Method

MATERIAL AND METHODS

The requisite data was collected from the literature of recent studies on HIV/AIDS and from sentinel sites. The HIV/AIDS estimates for Kerala state and India was provided by the National AIDS Control Organization (NACO) and also year wise reported number of HIV cases from Kerala State AIDS Control Society (KSACS). For finding the incubation time distribution, the data of twenty two Keralite HIV patients were retrieved from the Hospital record maintained in the
Kasturba Medical College, Mangalore, India. The variables collected were age, gender, incubation time, CD4 cell count, CD8 cell count. Back-calculation method and curve fitting method were used to estimate the HIV/AIDS cases. The data was analysed using Excel 2003, EXCELSTAT 2011, R 2.8.0, Statistical Package for the Social Sciences (SPSS) for Windows Version 16.0 (SPSS Inc; Chicago, IL, USA) and EPI Info 3.5.1 windows version. A p-value of < 0.01 (two-tailed) for distribution fitting and <0.05 (two-tailed) for rest all were used to establish statistical significance.

RESULT

The estimated Total cumulative AIDS cases in Kerala for the years 2005, 2006, 2007, 2008, 2009, and 2010 are around 35777, 48944, 62039, 45669, 45668, and 43605 respectively by back-calculation method with weibull(2) incubation time distribution.

Excluding the constant term from the equation and depending on the shape of the curve, the quadratic model was the best fit, for the forecasting of adult and children HIV cases($R^2=0.994$, p=0.0001). The projected Adult and children HIV cases in India for the years 2010, 2011, 2012, 2013, 2014, 2015, 2016,2017,2018, 2019 and 2020 are around 2440899, 2366860, 2275523, 2166888, 2040956, 1897726, 1737199, 1559375, 1364253, 1151833 and 922116 respectively.

CONCLUSION

It is the first study of the parametric distribution fitting in HIV incubation time of Keralite and weibull 2 distribution is the best fitted distribution. In our study mean incubation time of HIV is 4.4 years; the progression of disease in patients infected with HIV in Kerala seems to be rapid. This study reveals that back-calculation method is a powerful tool to estimate the cumulative AIDS cases of Kerala and it is having a decreasing trend. Curve fitting method is the best method when incubation time distribution is unknown. Quadratic model is the best fitted model for the forecasting of adult and children HIV cases of India and it is having a declining trend.