INCIDENCE OF TWINS IN AURANGABAD REGION

By

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SUMMARY

In the present paper we investigate models formulated by Hellin (1895), Guttmacher (1937) and others for the occurrence of twins in the Aurangabad region. The Poisson probability models were considered for the data. It is noted that for the Aurangabad region the occurrence of twin is 9 per 1000 births.

Introduction

It is noted that the number of births ordinarily resulting from a single pregnancy is an inherited characteristic fixed for each species. The average size of little for the mammals might be loosely related to several characteristics like, their size, number of breasts, composition of uterus, life span, etc. The anthropoides including man, ordinarily give birth to single young.

Past Studies

It is interesting to note that for large populations a statistical relationship between the frequencies of twins, tripletes and quadrapletes has been determined. The frequencies might vary among different racial groups. Hellin (1895) was first to formulate a mathematical relation between the various orders of multiple births. He observed that twins occurred once in 89 births, triplets once in 89^2 and quadraplets once in 89^3. However Guttmacher (1937) observed that twins occurred once in 90 births.

Whitfield (1986), rightly noted that there are considerable ethnic and geographic variations in the frequency of multiple pregnancy. Nylander (1975) observed the highest rates in Africa, with up to 45 twin pairs per 1000 births in Nigeria, lowest rates in some far-Eastern countries with rates of less than 5 per 1000 births and intermediate rates of about 10 to 12 per 1000 births among caucasians.

In the present paper we examine whether Hellin's ratio or the Guttmacher ratio holds good for the frequency of twins in Aurangabad region. Further we determine the frequency of twins in this region.

Description of Data

The data consists of records in the labour room register of Government Medical College and Hospital, Aurangabad within the period of 1984 to 1987. We have examined 25000 deliveries and observed in all 250 twins. Further this data was classified in groups of 100 births ac-

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cording to their order of registration. The number of twins in each group of 100 births was counted. The data is presented in Table I.

TABLE I

Frequency of Twins in Aurangabad—Region

Sr. No.	No. of twins	Frequency
1.	0	110
2.	1	83
3.	2	35
4.	3	17
5.	4	5
	Total:	250

Analysis of Statistical Models

The occurrence of twins is a mass phenomenon determined by a statistical distribution. Moreover an occurrence of twin is also a rare event which suggests consideration of a Poisson model for the data.

$$P(x) = \frac{e^{-\lambda} \cdot \lambda^{x}}{x!}, \text{ where } x = 0,1,2,\ldots \infty$$

Hellin's Hypothesis

According to Hellin the value of parameter λ in the Poisson distribution is 1.1235. The number of twins should follow the following model.

$$P(x) = \frac{e^{-1.1235} \cdot (1.1235)^{x}}{x!}$$

and

$\lambda_1 = 1.1235$, where $x = 0,1,2,\ldots 00$.

According to this model the expected number of frequencies of twins are as follows:

TABLE II

No. of twins	O	E
0	110	81.28
1	83	91.32
2	35	51.30
3	17	19.21
4	5	5.39

To test whether the statistical model holds good for the data, we apply the x^2-test of goodness of fit.

The calculated value of x^2 is 16.36. The tabulated value of x^2 for 3 d.f. at 5% level of significance is 7.82. The calculated value of x^2 is greater than the table value of x^2. Therefore the frequency of twins does not follow the Poisson law with the Hellin parameter.

Guttmacher's Hypothesis

According to Guttmacher the value of parameter λ in the Poisson distribution is 1.1111. The number of twins should follow the following model.

$$P(x) = \frac{e^{-1.1111} \cdot (1.1111)^{x}}{x!}$$

$\lambda_2 = 1.1111$; $x = 0,1,2,\ldots \infty$

TABLE III

No. of twins	O	E
0	110	83.64
1	83	91.44
2	35	50.89
3	17	18.81
4	5	5.22

To test whether the statistical model holds good for the data. We apply the x_2 test of goodness of fit. The calculated value of x^2 is 14.0572. The tabulated value of x^2 for 3 d.f. at 5% level of significance is 7.82. The calculated value of x^2 is greater than the table value of x^2.

Therefore the frequency of twins does not follow the Poisson probability law with Guttmacher's parameter.

Determination of Frequency

For the present data the value of the parameter of the Poisson model by the method of maximum likelihood is noted to be $\lambda_3 = 0.896$. The expected frequency of twins are presented in Table IV.

TABLE IV

St. No.	No. of twins	O	E
1	0	110	102 05
2	1	83	91.42
3	2	35	40.96
4	3	17	12.23
5	4	5	2.74

The formula for x^2 is $= \Sigma \frac{(O_i - E_i)^2}{E_i}$,

where O_i : — Observed frequency
E_i : — Expected frequency.

The value of parameter λ in the Poisson distribution is 0.896. The number of twins should follow the following model.

$$P(X) = \frac{e^{-.896} \cdot (0.896)}{x!}$$

$\lambda_3 = 0.896$, $x = 0,1,2,\ldots\ldots \infty$

We apply x^2-test of goodness of fit. The calculated value of x^2 is 5.9865. The tabulated value of x^2 for 3 d.f. at 5% level of significance is 7.82. The calculated value of x^2 is less than table value. The frequency of twins does follow the Poisson probability law. The fit is good for this distribution.

It is noted that in the Aurangabad region the occurrence of twins is once in 111 births (i.e. 9 per 1000).

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