Editorial

STATISTICS IN MEDICINE

Medicine has made rapid strides in the last four to five decades.

As Medical students, most of them are not exposed to the subject matter of Medical Statistics. They are under the impression that medical statistics meant collection of data, and one could convert these data as one wanted. Now it is realised that Medical Statistics is a Scientific process to understand any phenomenon in medical research, and Biostatistics has gained importance. Statistics has both been described as a mathematical Science and an applied Science too.

Analysis by Statisticians would lead to improvements in data bases and new knowledge as a result of analysis. Medical practitioners require their statistician colleagues for quantitative statistical formulation of their problems or studies which is called statistical model building.

Two realiable characteristics for measuring data are Reliability and validity.

Reliability : Deals with inherent performance of instruments. A reliable instrument gives consistent results when applied more than once on the same unit under similar conditions.

Validity : A measurement has validity if it is indicative of the end it is supposed to measure.

The two components of validity are sensitivity and specificity.

Sensitivity : of a test or procedure or instrument is the quotient of the change in an observed measure and the corresponding change in the value of the quantity or factor that is being measured.

Epidemiologically : It is the proportion of true positives correctly identified.

***Specificity** : is defined as extent to which a test or procedure or measuring instrument gives a response for the presence of a given variable and is dead to the presence of all other variables. Epidemiologically it is the proportion of true negatives identified by it.

Other components are the predictive values :
+ve Predictive value : is the probability that a +ve test result indicated a genuine + ve result.
-ve Predictive value : is the probability that a -ve test result indicates a genuine -ve result.

For any study to be carried out there are several phases. The preparatory phase, the preintervention phase, intervention, preevaluation and evaluation.

The study design includes several things :

Variables : Firstly there has to be the selection of the variables to be studied. Then there is the operational

definition of the variables and the scales of measurements of the variable.

Sampling : The methods to be used are decided. These may be completely randomised: Random block, stratified random, cluster sampling etc. A trial may also be nonrandomized. It may be single blind or double blind. Then estimation of sample size may be done based on statistical methods.

Then the different tools or instruments should be fixed e.g. formats, examination findings etc.

The methods of data collection should be decided e.g. Interviews etc.

Finally methods of analysis have to be determined using suitable tests.

Chance can give rise to differences between groups being studied and so every time a difference is observed we have to know whether the difference is unlikely to have occurred purely by chance alone or in other words its statistical significance.

Whenever statistical methods have been applied there are tests of statistical significance. Their use is seen in Scientific papers, reporting on clinical trials, epidemiological studies and in other health related research.

Few of the several tests for the statistical significance of a difference include :

- Study of differences between two means
- Study of differences between two proportions
- X^2 (Chi Square) Test comparing two distributions.
- t Test : Usually used for a small sample and may be one tailed or two tailed.
- Fishers exact test: Test of significance for evidence of association from 2 x 2 Contingency tables in case of small expected frequencies and small sample sizes.

There are many types of tests catering to different types of data and differences being dealt with.

The level of significance or the probability of a difference arising purely by chance below which it is considered sufficiently unlikely for the difference to be considered statistically significant is the P value (conventionally 0.05). Thus $P < 0.05$ is "significant" and $P<0.01$ is "highly significant" and $P>0.05$ is "not significant".

For a given study design there is usually only one really statisfactory way of analysing data and presenting results.

Thus it is important to have the help of a statistician right in the begining of the particular study one wishes to undertake.

In these days of satellite communication and globalization having one's research or papers appropriately statistically analysed has become almost mandatory if one's work has to have credibility worldwide.

It is high time some information about preliminary background of statistics be given during undergraduate medical education, and thorough orientation course in statistics is given during the postgraduate medical education.

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