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Graphs; the science of dots (...) and lines.

An optimal way to tell the completed science story in 4 dimensions

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Including a graph in any scientific presentation is actually launching an elegant method of representing complex scientific data with accuracy and brevity. Graphs explain trends and relations. The editorial team of every scientific journal is always interested in having the correct type of graphs to support the text of a manuscripts. Optimal and adequate use of graphs will save print space without losing information. Although various computer programs provide assistance in converting data to graphs, the author must have an understanding of which kind of graph should be used for various types of data.

Current issue of PJNM has 11 graphs in the listed articles. We should have probably more graphs, and some at least could have been redone for greater clarity. Careful evaluation of published manuscripts in well reputed journals shows that substantial number of articles need further work to improve statistics and graphs provided therein [1]. Accurate use of graphs needs detailed learning which is beyond the scope of this editorial; however, some guidelines are being provided as a quick reference. The reader is directed to the references at the end for further reading.

Graphs are mostly used to explain the patterns and trends between different variables of data. The choice of graphs depends on the type of data. For example, line diagrams/scattergrams are preferred where dependent and independent variables are numeric while bar graphs are used when only the dependent variable is numeric. Bar graphs or pie charts can be used to represent proportions data. In addition, frequency polygon, age pyramid, survival curve, and receiver operator characteristic curve are frequently used for data illustration.

A scattergram is generally used to present two variables and it determines whether *Y*-axis variable are dependent on *X*-axis variable. A line graph is similar to scattergram, the only difference is the *X*-axis variable changes over time/successions. By using line graphs, various dependent

various can be represented on the same graph. A bar graph illustrates discrete/categorical data and the height of bars are proportional to the values they represent. Bar graphs are frequently used to compare single variable among different groups [2]. The histogram or frequency distribution graph, represents numerical data of continuous variable in the form of bars without any gaps between the columns. A pie chart represents the numerical proportions in the form of slices which all add up to form a circle illustrating the entire data. The arc length of slice is directly related to the quantity it represents. A boxplot graph is frequently used to depict the variation in a “set of data” and data is summarized as minimum, “first quartile, median, third quartile,” and maximum. The distribution and skewness of data is represented by the spacing between boxes, while the line extending from the boxes indicate the variability beyond upper and lower quartiles. It helps in understanding whether the data is symmetrical or skewed [3].

Calligraphy in graphs: Crowded graphs with unnecessarily extended abscissa (*x*-axis) or the ordinate (*y*-axis) may not only confuse the readers but will result in empty spaces that will occupy the space of data. The graph axis must be labelled appropriately with proper units where required and legends must include all necessary related information. Composite graphs are generated in a case where two graphs are related to each other, for better visualization and appropriate explanation of related information. The font color and size should be uniform for all text in graph and bold all important information instead of changing their color.

Using some key points, we can make our data more presentable with improved visual illustration:

1. The primary step is to choose appropriate graph for better understanding of data

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2. Follow the normal trend while designing scale i.e., y -values increase as we move up and X -values increase as we move to the right
3. Avoid (unless direly needed) cropping of axis values as it will result in false graph presentation due to enhanced marginal difference.
4. Use appropriate annotations in graph to make it more meaning and understandable
5. The graph should be labelled properly along with detailed and descriptive legends to avoid confusion
6. Use discontinuity scale in appropriate manner to display large data which cannot be shown in continuous scale

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