

Abstract

Results section comprises an important part of the paper that describes the observations obtained after an investigation. This section is subdivided into three segments, viz., descriptive form the Text, providing numerical data in Tables and visualizing the observations in Graphs or Figures. All these are arranged in a sequential order to address the question hypothesized in the Introduction. The description in Text provides clear content of the findings highlighting the observations. It should not be the repetition of the facts in tables or graphs. The matter in the text should convey the over all findings without referring to Figures or Tables. It should also describe the statistical analysis of the observations. Tables are used to summarize or emphasize descriptive content in the text or present the numerical data that are unrelated. Tables should not be used for numerical data that can be summarized easily in the text or can presented effectively in a graphic form. Illustrations should be used when the evidences bearing on the conclusions of a paper cannot be adequately presented in a written description or in a table. Tables or Figures should relate to each other logically in sequence and should be clear by themselves and is achieved by the text.

Introduction

Accumulation of data has no significance unless published otherwise. Thus, writing a paper is as important as doing experiments. The paper is organized in such a way as to answer the questions set by Bradford¹. They are: Why did I start? (Introduction); What did I do? (Methods); What did I find? (Results); and What does it mean (discussion and conclusions)? Thus, a scientific paper has a definite order having a Title, Abstract, Introduction, Results, Discussion, References, Tables, Figures and their legends.

In this chapter, the observations of the experiments or a scientific study are presented. The results are organized in such a way to support your hypothesis or discussion. It is advisable to present the results as titled paragraphs. Each of these paragraphs should be able to provide the data of the observations presented in the text, tables and graphical from. The sequence of tables and figures has to be arranged in the logical sequence to support the hypothesis that is under investigation.

Text: The Body of the Results Section

The findings of a study should be described clearly and effectively. Numerical data can be usually presented more effectively in tables or graphs than in the text as mean values with appropriate measure of variability (SD or SEM). The content of the results section should follow the sequence to answer a question in a logical order. Usually this section should begin with the description of control observations. Provide a brief account of salient features of findings in normal or control conditions. Therefore, the first section of the results section presents the data establishing the similarity of two groups. If the data are presented in a table form then the text of the results section should highlight the observations mentioning the significant differences between the groups while referring to the Tables or Graphs.

Results section must provide information on all subjects/experimental conditions under study not only on the experiments which gave positive results. Therefore, the observations should include such subjects as those who dropped or participated only briefly, who were changed from treatment protocols, who died before completing a treatment, and those lost to follow up. The data on results in trial may have to include the findings when the data from all the subjects who entered the study are analyzed, in addition to the findings based on all subjects who completed their part in the study.

In a paper reporting a therapeutic trial, the data from the control group (treated with the standard drug) or the data from the trial group (the new drug) is to be given from the old to the new or from the known to the unknown. In a therapeutic trial of two drugs, two groups of patients in which they were used must be shown. If possible these groups determine the status of these groups. If they have a close similarity in all characteristics then any differences in the treatment can be attributed to the drugs and not to the group differences. In the Introduction, the summarization of the lacunae of the study pertaining to the research has been given and then hypothesized the question to be answered. Likewise, in the Results section one should first present the data from the known or the standard-drug group (or the control group, if no standard treatment was available). Then one should present the data of the experimental group in which the new drug/experiment was used. This sequence does not necessarily call for separate paragraphs for each study group.

Results section should give clear answer to the objectives defined in the Introduction. Thus, statements in the text summarize the data given in the tables and should include clear statements of statistical significance or the confidence intervals. It is incorrect to hide the facts by using phrases such as "appeared to be greater or lesser" and "demonstrate promising trends". Be sure to include the statements of statistical significance and a brief mention of the test/s by which they were derived (for example, Fisher exact test, Student's t test; One way or two way ANOVA, whichever is appropriate). Also, include the dose/concentrations of drugs or chemicals used in each treatment protocols.

Tables-Authenticate the Results in a Numerical Format

When writing a paper, you probably have to decide whether some of your observations required to be presented in the form of Tables. If the paper is to report clinical research or laboratory research, an epidemiologic study, or a drug trial, the accumulated numerical data in spread sheets has to be arranged in tables for analysis before one begins to write. If it is a Review article, you may have compiled the tables by placing the summaries of what has been read. At some point between the first draft and the final version, one should decide which tables are really required, which can be better replaced by graphs/illustrations, and which tables can be discarded by describing them in the text.

The instructions to authors in a given journal provide information for authors about the word limit, and on the number of allowed tables or figures. If not, carefully study the recent papers of a particular journal. This will provide the idea regarding the requirements of text words (excluding references), the tables and the illustrations (single or multipart figures). A useful general rule is no more than 1 table (or illustration) per 1000 words of text. The aim of the tables is to present the data clearly without cluttering the information.

The first step is finding out the limit of Tables/Figures, the journal will probably accept in relation to the length of the paper. If it is 5 Tables and/or Figures then plan accordingly ultimately making the total of 5. Now ask yourself a question whether you really need the maximum number of items the journal might accommodate. Most of the journals prefer fewer tables

specially those giving multiple complex data accumulated by the authors without comprehension. Tables are more expensive to typeset than text, so editors are prone to ask authors to eliminate tables. Therefore, you may ask the following questions and make your judgment accordingly. Do you have too many tables for the length of your text? Are you ready to reduce or delete tables during revision? Which of the tables are essential and which can be eliminated? Which can be compromised without losing the emphasis? Answer these questions and then reduce the tables as per your answer.

If you have read a short version of your paper in a conference by showing some slides by simplifying the data for clarity of presentation before the audience, then that table may not be suitable for presentation in the paper and can be easily summarized in the text. Some times in the initial stages of writing all the data were summarized for authors convenience. The same table was also used for a presentation before a small peer group. Such tables can be transformed to text or figures and should not be used in the paper. Further, using a large number of such simpler tables in a paper gives an impression that the author has spent little time in thinking about the data for presentation into a journal paper. Some tables can not be replaced by text statements but can be better represented as graphs or illustrations.

The data on two related variables such as the effect of a dependent variable whose values are determined by an independent variable, as seen in the concentration-response or time response relations, can be effectively presented by line graph. Also data on one or more variables changing through time, such as clinical data like temperature, blood pressure, blood counts of a patient during a hospital stay can be easily presented by line graph. Data showing the differences in mortality rates or drug resistance of tuberculosis in a given geographical area (different states of India) can be usually be presented more effectively in one or more types of illustrations, graphs, charts or epidemiologic maps.

Use tables to present the exact values for numerical data of serum electrolytes such as sodium, potassium, chloride, calcium, phosphate, magnesium and acid-base variables pH, CO₂, bicarbonate levels. It is noteworthy that some readers may be interested in knowing the exact values to make their own assessments. These things are difficult to present in the text without providing a long stretch of text crowded with numbers and are very difficult to read.

It is reasonable to use the tables for presenting the observations in numerical format if it can not be summarized in the text with a few sentences. Secondly, when the relations of data to each other or to a time sequence can not be made more clearly in a graph. Thirdly, data contain number of variables of a given experimental design or require the presentation of the exact values that is required to make the point. In some papers, descriptive information may be more efficiently presented in a table than in text. The most frequent use of a table in place of text is to summarize cases in a review article or a case-series analysis. Full description of more number of cases in the usual format of case reports can take up many pages of text. Even though each case may have its own clinical variation but they are likely to have many common features and each case description reads like the next. An efficient solution may be a large table that gives the essential numerical data (age, weight, temperature, and laboratory-test values) and brief descriptive phrases for symptoms, physical findings, imaging findings, and so on. You might retain a full case report of representative cases (one or two) in the text to give the clinical picture of the disease or syndrome. In constructing large case-summary tables, one has to be very careful to find out what size tables are acceptable to the journal.

If your paper is descriptive (a teaching or a review article), you can emphasize important points by listing in small tables giving main features of a condition, disease or syndrome, symptoms and signs of adverse effects, and differential diagnosis. Such tables often include the frequency or percentage of occurrence for each item so as to provide additional data of their relative importance. The tables in the text are to be organized in their sequence as they appear in the text. Next consider the tables as a sequence, with appropriate relations to one another.

A good test to apply to your Table's format is to compare the number of column headings to the number of row headings. If the ratio is greater than 2:1, consider reorienting your table. Each of your tables should be readily understood without referring to the text. The title provided will help the understanding further. The column headings and row headings should be clear with appropriate units. The sequence of columns from left to right should correspond to the way data were collected. Rows are arranged according to the logical sequence of the data that need to be highlighted or in the ascending order. For example, in a clinical study, start with control then present mild, moderate and severe forms of presentation.

The title of a table should be specific enough to enable the reader to understand the table. Avoid providing information presented in the column or row headings. If the title of a column or row headings are long then abbreviate them and explain the same in footnotes as shown in footnote of the Table 1. Footnotes may specify, for example, drugs, dosage, and administrative procedure in a table with data from a drug trial.

Each column heading for numerical data should include the unit of measure for the data. That unit should apply to all data in that column. Another unit of measure should not be used in the same column. In that case restructure the table to accommodate the second kind of unit and its accompanying data in another column. If groups of columns logically belong together, label them with a "combined column heading" and under this subdivide the columns further as shown in Table 1. Similarly, if groups of rows are logically related, indicate such groupings and sub groupings with appropriate headings and indentations that will make their relations with each other. If the row headings designate numerical data, give the unit of measurement immediately after headings. The cells of columns or rows should not be left blank. If the appropriate datum at such a cell is "none", indicate this fact with a zero. If there is no data, the absence should be indicated by an abbreviated notation explained in a footnote, such as ND for "not done" or NA for "not available" or "not applicable". Further, large numbers can be given as smaller numbers with appropriate multiplications in a column/row heading while not using such notations as "x 10³" for thousands or "x 10⁶" for millions; these may be ambiguous. Do not mix units in a single column of data. If, for example, a column gives data on duration of an effect on symptoms and some of the data are in days and some in weeks, change the weeks to equivalent totals of days so that the single column-heading "days" can apply to all data in the column. It is better present the percentages as integers to the next nearest number. Percentages given for compared fractions with small denominators are likely to imply statistically significant differences. Therefore, statistical assessment must be performed on the absolute numbers, not on the percentage values. If the presence of data with percentages seems confusing then omit the percentage values. If percentages are given for small numbers, confidence intervals provided for the percentages will, obviously, indicate their low precision.

Table-1 Serum lipid profile of diabetic patients receiving herbal-X preparation. The values are mean \pm SD from n number of observations given in parenthesis.

Groups	Serum lipid profile (mg/dl)			
	Total cholesterol	VLDL	HDL	Triglycerides
Group 1	Male (n)			
	Female (n)			
Group 2	Male (n)			
	Female (n)			
Group 3	Male (n)			
	Female (n)			
Group 4	Male (n)			
	Female (n)			

* Difference between means assessed by Student's t-test, $P < 0.05$. Group 1, Age matched control group; Group 2, Age matched control group receiving only herbal preparation; Group 3, Patients receiving standard treatment; Group 4, Patients receiving standard treatment + herbal preparation.

The means of the observations in a table assessed for statistical significance of difference between them should each be tagged with a symbol that is explained footnote for the test used and the conclusion drawn from it. Make sure that all data in a table match with the data presented in the text anywhere else in the paper (title, abstract, text, or another table). Also check for internal consistency of the data in a table. For example, that percentage values presented when summed up should make 100% correctly. Check all addition, subtraction, and any other mathematical operations implied in the table. Some times abbreviations of certain things become inevitable in the columns or rows of the tables. All such abbreviations in tables must be explained in footnotes, even if they are explained in the text. Finally, check for the mention or referencing of a particular table in the text of Results section.

As mentioned earlier the footnotes used should explain abbreviations, the study conditions, statistical assessments, acknowledge source of the table (if it has been adapted from a previously published table), and other details to make the table understandable by itself. Further, it is preferable to use the symbols as footnote signs (*, @, \$, #, **, or superscript lowercase letters in alphabetic sequence like a, b, c, and so on) to indicate the data in table. It is better to avoid the use of numbers as footnote markers.

All parts of a table should be typed double-spaced, including column headings and footnotes. Double-spacing is needed to give the copy editor enough room for marks to indicate publication style to the printer. In general, avoid using vertical lines and rules in the table. Start each table on a separate page. If a table cannot be completed on a single sheet, it can be continued onto a second sheet giving details of the column headings in the next page.

The number of tables that can be used in a paper may be limited by the journal. You can take proper precaution so that deletion of tables can be avoided at the time of revision. Tables should not be used for numerical data if the data that can be summarized easily in the text or their relationship which can be illustrated clearly in a graph. Tables can sometimes be used to summarize or emphasize the descriptive contents in the text. The structure of each table should

be carefully thought out for a logical internal sequence. Tables should relate to each other logically in a sequence. Care should be taken with proper use of units and clear presentation of the data in the fields of the table.

Figures- Means to Visualize the Data

Before you began to write the first draft, you gathered the materials you needed to start work on it. These may have included photographs, roentgenograms, scans, tracings electrical recordings (ECG, EMG, EEG, and other potentials) or mechanical recordings (isometric or isotonic contractions, blood pressure recordings or other signals) and graphs of experimental data. Some time before you prepare the final draft you must decide which of the illustrations to use or not.

The illustrations or figures should qualify for the following points. Do these figures or illustrations provide evidence for the study? Do they enhance the efficiency of presentation? Do they emphasize the points of the observations in a given study? Illustrations should be used only when they carry evidence needed to support a conclusion. If the paper is about newly discovered structural details of an organism then the morphological features of the same including the electron micrographic details are required as evidences to support the paper.

If a figure or graphical illustration is far more efficient in presenting the evidences for the conclusion rather than a long statement in text, then the figure is essential. A family tree of a newly identified syndrome appears in members of the family as a Mendelian autosomal dominant trait; a written description of the same by many lines of text does not make the point as efficiently a graphical representation. Numerical data showing the relation of 2 variables can be efficiently presented in a graph. Further, it is also necessary to emphasize the points as in simple bar graphs comparing the hormonal profile in pre-menopausal and post-menopausal women effectively to emphasize the difference.

Editors/Reviewers of the journal may not agree for all the illustrations supplied. If your figure provides evidence or enhance the efficiency or emphasize the data effectively, then the illustrations qualify for their presence in the manuscript. If the answer is negative, then do not include it as it would save the time, effort, and money by not having to discard illustrations while revising the paper and to rewrite the text related to them.

Inadvertent use of illustrations in the journal should be avoided. Discard tables or illustrations in favor of equivalent statements in text if you can. Combine 2 or more illustrations into a single, multipart illustration (or do the same with 2 or more tables). The illustrations to be combined should be related in subject; if they are graphs, they should also be similar in proportion and scale of lines and lettering. Finally, do not use illustrations that duplicate data presented in tables.

The computer graphics have revolutionized the figure qualities. Even to make the illustrations using computer requires professional skill. If you do not have the professional skills then it is better to take the services of professionals. Incompetently prepared illustrations reflects against the competence of the author and perhaps even about the soundness of the text. Professionals or photographers need guidance from the authors about what points the illustrations must highlight. Obviously, authors have to provide both the raw materials for making the illustrations, such as providing numerical data, tracings, photographs, imaging pictures etc. In the instruction to authors for online submission of artwork in various journals, the information provided is quite informative. Besides these, you may find useful tips in the following references²⁻⁵.

A wide variety of graphs can be generated from EXCEL, Sigmaplot, Graphad and many other graphic softwares. The relations of two variables, for example, a graph showing effect of

ageing on diastolic blood pressure is the simplest form of the graph (independent variable is usually shown on the X-axis, the dependent variable on the Y-axis). Many types of graphs and diagrams can be prepared using these softwares. The most complex line illustrations that depict surgical procedures, anatomical views, roentgen graphics, CT or MRI scans, electron microscopic pictures or the actual photographs of the specimens, can be made easier with the accompanying drawings showing the outlines of such pictures. Now a day's most of the journals accept supplementary material such as video clippings or color photographs, authors should provide such information in the supplementary material.

Tracings obtained by the recordings obtained during an experiment (electrophysiological, biochemical, behavioral alterations as images etc) stored in the computer as a computer graphics can be copied or imported to the graphs you would like to depict either in powerpoint, coral draw, photo shop or any other software. While importing these pictures make sure that the images are not distorted by disproportionate stretching of the picture either vertically or horizontally.

Diagrams can be used to illustrate relations of connected units for example, a sequence of procedures such as in a diagnostic algorithm, or a table of organizational titles and responsibilities. For such diagrams use the presentation software such powerpoint and make it to your satisfaction. Diagrams showing relationships among family members and generations should use well-established conventions, which are illustrated in textbook on human genetics⁶.

Written permission to reproduce photographs of patients in which the patient might be identified should be acquired when the pictures are taken. Parts of photographs that would identify a patient should be blacked out or cropped, if possible. While taking photographs include the area of neighboring tissue to show the relation with the other organs and then zoom it.

Photomicrographs should be obtained using appropriate lighting and color filtration to ensure the best images. It may be better to start with low-power views then show the high-power views. Always indicate the scale with each image rather than just describing low power or high power. Letters and arrows may also have to be applied to identify specific parts of photograph and line drawing showing the main elements in outline, with identifying letters or abbreviations.

Color printing is far more expensive than black and white. Usually color printing are charged. Color photographs may be essential to show the various color staining as in immunocytochemical methods, fluorescent imaging, blood flow imaging, illustrations of some skin lesions (like faint rashes), subtle histological-stain colors, and multicolor scan images.

Illustrations should be understandable without having to refer to the text it accompanies. Therefore, all of its features should be identified on it or in the legend. Graphs of numerical data must have their horizontal and vertical axes labeled to indicate the variables plotted and their units. Avoid crowding of graphs by too much textual material. Use abbreviations to simplify and explain them in the legend. An alternative is to use standard symbols in drawing the graph that can be reproduced and explain in the legend. Size and format of the figures are usually indicated in the instructions to authors in most of the journals. The size of the labels should be such that even after reduction of the illustration to 50% the output is clearly readable. Care should be taken for line thickness, tick size, labeling of X and Y axes etc.

Photographs of closely related subjects are sometimes more effectively presented in a single, multipart illustration. An example is a general view of the cut surface of a kidney sliced longitudinally accompanied by several close-up photographs of details of the cortex, a pyramid, and the pelvis. It is better to label each component of this Figure as A, B, C and so on.

Each illustration must be accompanied by a descriptive legend. Technical details such as stains and magnification, and additional description needed by the reader to understand the illustration without referring to the text are to be given. Legends should be typed on a separate page of the manuscript.

Illustrations thus should be used when the evidence bearing on the conclusions of a paper cannot be adequately presented in a written description or in a table. Emphasis on especially important points to be made is another reasonable justification for their use. Limits set by a journal on the number of illustrations must be observed; if the journal does not specify the limit, it can be estimated by examining recent issues to calculate the number of illustrations (and tables) used per 1000 words of text without compromising the details of your observations. Numerous details in format, lettering, and labeling call for careful attention while preparing illustrations. Their legends should be written with a view to ensuring that the illustration can be understood when it is seen by itself.

Conclusions

Results section deals with the observations made by the authors thus is not hypothetical. The observations remain unchanged over the time while the interpretations (discussion) may change with time. Therefore, the data are to be presented clearly and effectively providing the evidences in the Text, Figures or in Tables. Further, the interpretations of the discussion sections are entirely based on these observations.

References

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