



# Writing a Good Research Paper

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# Learning Objectives

- To develop effective technical writing skills.
- To organize a research paper in such a way which allows people to read your work selectively.



# Main tips

- Choose your topic
- Locate information
- Prepare your outline
- Writing the text
- Prepare bibliography
- Write abstract and keywords
- Prepare a title page
- Final check list



# Choose your topic

- To write a good research paper, you must be **specific** about your topic.
- The topic of a research paper should be specific enough to cover sufficiently. If your topic is too broad, you will have difficulty in completing your paper. For example: ‘*The stature estimation*’ is too broad because there are so many parameters which are used to estimate stature. ‘*Stature estimation from the dimensions of head and face*’ is right choice of topic.



# Example

**PULSE WAVE  
VELOCITY &  
ELECTRONEURO-  
PHYSIOLOGICAL  
EVALUATION IN  
PATIENTS OF  
RHEUMATOID  
ARTHRITIS**

**Reviewer's comments:**  
The author(s) have needlessly combined two parameters, neurological and vascular, without any relationship. If properly presented, these two can be published as separate papers.




# Locate Information

- Use information from a variety of reference sources. These sources include:
  - ✓ Scholarly Journals: Use Pubmed and Google Scholar - These are two abstracting services which are freely available to researchers; and use online sources of open access journals e.g. Pubmed central, BioMed central, Bioline international, etc.
  - ✓ Books, Periodicals and Newspaper



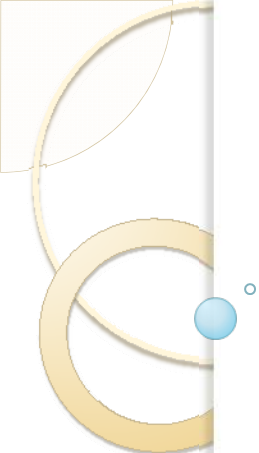
# Prepare your outline

- Headings should be appropriate to the nature of the paper:
- ✓ Original research papers: Introduction, Methodology, Results, Discussion, Conclusion and references.
- ✓ Case Reports: Introduction, Case Details, Discussion, Conclusion and References.
- ✓ Review articles: Introduction, Headings as the author's desire, Conclusion, References.
- ✓ Other papers: Brief Communications, Letters to editor, etc.

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- **Brief Communications** are brief, but complete articles published in a special section of some journals. The text should be organized in the same headings as the ‘original research paper’.

Manuscript	Reviewer's Comments
The manuscript titled ' <i>Growth Pattern of Preterm and IUGR Babies in an Urban Slum of Kolkata, West Bengal, India</i> ' had been submitted to IJMU as an original research work.	The manuscript was considered for publication as a ' <u>Brief Communication</u> ' because of having weaknesses: <ol style="list-style-type: none"><li>1. The sample size is small.</li><li>2. There is significant amount of attrition of sample size over time.</li><li>3. There is no outcomes information.</li></ol>





**Letters to the editor** should be submitted in response to the topic discussed in the journal or to raise other topic of interest.

For example

## Research paper

- Gungadin S. Sex Determination from Fingerprint Ridge Density. *Internet J Med Update* 2007;2(2):4-7.  
[http://www.akspublication.com/paper01\\_jul-dec2007.htm](http://www.akspublication.com/paper01_jul-dec2007.htm)
- Altan A. A Different Technique of Primary Indirect Inguinal Hernia Repair by Inserting a Synthetic Mesh into the Pre and Retroperitoneal Spaces to Wrap the Peritoneal Reflection: Preliminary Report. *Internet J Med Update* 2010;5(1):29-34.  
[http://www.akspublication.com/paper05\\_jan2010.html](http://www.akspublication.com/paper05_jan2010.html)

## Letter to editor

- Kanchan et al. Sex determination from fingerprint ridge density: a response to Gungadin. *Internet J Med Update* 2008;3(1):56.  
[http://www.akspublication.com/letter01\\_jan-jun2008.htm](http://www.akspublication.com/letter01_jan-jun2008.htm)
- Yagnik VD. A Different Technique of Primary Indirect Inguinal Hernia Repair by Inserting a Synthetic Mesh into the Pre and Retroperitoneal Spaces to Wrap the Peritoneal Reflection: Preliminary Report (Reaction to article published in January 2010, IJMU). *Internet J Med Update* 2010;5(2):75-6.  
[http://www.akspublication.com/letter02\\_jul2010.html](http://www.akspublication.com/letter02_jul2010.html)

# Writing the text

- Your paper should be adhered to the form and style required for the Journal. As per authors' guidelines of a journal, the author should use a system of primary, secondary and tertiary headings. As per this system:
  - ✓ **Primary Headings:** All letters of primary headings are in caps (e.g. **METHODOLOGY**).
  - ✓ **Secondary Headings:** Only the first letter of the secondary heading and proper nouns are in capital (e.g. **Sample collection; Techniques for taking measurements; Statistical analysis**).
  - ✓ **Tertiary Headings:** Only the first letter of tertiary headings is capitalized (e.g. *Maximum head length; Maximum head breadth*).

All headings are boldfaced and only tertiary headings are italicized.




# GENERAL STYLE

- To make paper readable:
    - ✓ Print or type using 12 point standard font, such as Arial, Times New Roman, etc.
    - ✓ Typed material should be in double space.
    - ✓ The pages should be numbered.
    - ✓ Use paragraphs to separate each important point (except abstract).
    - ✓ Confine each figure/table to a single page.
    - ✓ Adhere to recommended page or words limits.
- Placing a heading at the bottom of a page with the following text on the next page should be avoided.



# INTRODUCTION


- Your introductions should not exceed two pages (double spaced, typed).
- The purpose of an introduction is:
  - ✓ to acquaint the reader with the rationale behind your work, and
  - ✓ enable the reader to understand and appreciate your objectives.

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- To produce an effective introduction:
    - ✓ Describe the importance of your study, provide a broad context.
    - ✓ Provide a rationale. State your specific hypothesis or objectives of your study and describe the reasons for selecting them.
    - ✓ Present background information as needed in order to support your hypothesis.




# METHODOLOGY

- Methodology may be reported under separate subheadings and can be incorporated together in a heading of ‘Materials and Methods’.
- The objective is to document all specialized materials and procedures, so that other people may use your methodology in their study and judge the scientific merit of your work.

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- For better presentation, you should write under separate subheadings such as **Sample collection, Procedure and Statistical analysis.**
  - **Sample collection-** It includes sample size (gender and age group), place of sample collection, period during which the study was conducted and the materials used for this study. You can also add inclusion and exclusion criteria for the study sample.



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- **Procedure-** Describe the methodology completely. If well documented procedure is used, report the procedure by name with reference.
  - **Statistical analysis-** To be concise, report the appropriate statistical method used for your data analysis. (Statistical Analysis of Medical Data - Doing it right by *Dr. Vandna Jowaheer* [http://www.akspublication.com/editorial\\_july2009.html](http://www.akspublication.com/editorial_july2009.html))



# RESULTS


- The purpose of this section is to present and illustrate your findings.
- You must be aware of the contents that would be included in a research article from any raw data.
- Summarize your findings in the text and illustrate them in form of figures or tables.
- Analyze your data and then prepare the analyzed data in form of a figure, table or text.


# Example

- **Hand length:** Table 3 shows that in males, right hand length varied from 15.30cm to 21.00cm with mean value of 18.89cm and standard deviation was 0.88. Whereas, left hand length varied from 15.40cm to 20.80cm with mean value of 18.90cm and standard deviation was 0.87. In females, right hand length varied from 14.80cm to 20.40cm with mean value of 17.22cm and standard deviation was 0.92. The length of left hand varied from 14.80cm to 20.40cm with mean value of 17.22cm and standard deviation was 0.93.

**Table 3: Sex wise distribution of hand length**

	Male		Female	
	Right side	Left side	Right side	Left side
<b>Mean</b>	18.89	18.90	17.22	17.22
<b>S.D.</b>	0.88	0.87	0.92	0.93
<b>Minimum</b>	15.30	15.40	14.80	14.80
<b>Maximum</b>	21.00	20.80	20.40	20.40

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- Reviewer comments
    - ✓ The summary of Table 3 is not required. You are simply repeating what you have presented in the tables. Just direct the reader to them.
  - Changes done
    - ✓ Table 3 illustrates mean value, standard deviation and range of hand length in both males and females.

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- Some points to be remembered...
  - ✓ Do not discuss or interpret your results; do not report background information.
  - ✓ Use past tense when you refer to your results, and put everything in a logical order.
  - ✓ In text, refer to each figure as "figure 1," "figure 2," etc. and number your tables as well as "table 1," "table 2," etc.
  - ✓ Place figures and tables in order at the end of the manuscript (following references) or you may place them within the text of your results section.
  - ✓ Figures must be numbered consecutively along with captions (caption goes under the figure).
  - ✓ Each table must be titled and numbered consecutively (title with description goes above the table)



# DISCUSSION

- Interpret your data in the discussion and compare your results in context with previous researches.
- Decide if your hypothesis is supported, rejected, or if you cannot make a decision with confidence. Do not simply dismiss a study or part of a study as "inconclusive." Draw the conclusions based upon the results.
- A conclusion is the last paragraph of your research paper. It summarizes the strong points of the paper. You may give future directions and limitations of your study.

The biggest mistake that students make in the discussion is more or less re-states the results.



# Prepare Bibliography

- There are two main methods of writing references:
  1. Harvard (author-date) System
  2. Vancouver (author-number) System

## Harvard System

- *Style in text citation:* For a single author use 'Adams (1995), If there are two authors use Gordon and Price (2000), and If there are three or more authors use the name of the first author followed by et al., e.g. 'Gordon et al. (1989). List a string of references in chronological order, e.g. (Black 1991; Smith and Black 1995; Bennett, et al 1999).
- *Style in list citation:* Alphabetical, for examples:  
Adams, A.B. (1995) Book Title. Publisher, New York.  
Bennett, W.P., Hoskins, M.A., Brady, F.P., et al. (1993) Article title. Journal Title . 334, 31-35.  
Black, M. (1991) Chapter title. Book Title . Blackwell Science, Oxford, pp. 12-28.  
Gordon, I., Turner, R., Price, T.W. (1989) Chapter title. Book Title . Publisher, Place of publication, pp. 121-1125.





## Vancouver System


- *Style in text citation:* The numbers used to cite references are often in superscript.
- *Style in list citation:* References are ordered numerically in the reference list as they have appeared in the text (not alphabetically). For examples:
  1. Bennett WP, Hoskins MA, Brady FP, et al. Article title. *Journal Title*. 1993;334( ):31-5.
  2. Adams AB. Article title. *Journal Title*. 1998;46(Suppl. 2):617-9.
  3. Cummings M. Chapter's name. *Book Title* edition. Name of Publisher, Place of Publication 1995:12-28.
  4. Adams AB. *Book Title*. Publisher, New York 1983.



# Write Abstract and Keywords

An abstract is a concise single paragraph summary of your research work. It attracts readers to read your paper. After reading the abstract, a reader can get a quick idea about the rationale behind your study, general approach towards the study, relevant results and important conclusions.

As a summery of your completed work, it is always written in past tense.

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- To write an effective abstract, the following points should be included:
    - ✓ Purpose of the study- Aims and objectives.
    - ✓ Methodology- Brief description.
    - ✓ Results- Include specific data and results of statistical analysis.
    - ✓ Important conclusion

# Prepare a Title Page

- This can be prepared as per 'Paper Submission Guidelines' of Journal. Generally, it includes:
  - ✓ Title:
  - ✓ Authors' Name and affiliation: Authors' full names (Prof./Dr./Mr./Ms. \_\_\_\_\_), highest academic degrees, Designation and affiliations (Name of department and institution)
  - ✓ Details of manuscript: Type (Original Work/Review article/...); Number of text pages with references; Number of tables and figures.
  - ✓ Keywords
  - ✓ Corresponding author
  - ✓ Authors' Contribution




# Check list

- Before submitting your paper, please refer the points of following checklist:
- ✓ Have you read the ‘Instructions for Author’?
- ✓ Do you have all the files of the manuscript in an acceptable format? – Because the manuscripts that are not in the correct format will not be reviewed.
- ✓ For the research papers containing results of human and/or animal studies, have you taken the approval by local ethical committee and informed consent from each subject prior to inclusion in the study?



# Important points to be remembered...

- Actually reading research papers is a good way to learn how to *write a 'good research paper'*.
- The very first decision you need to make is to which journal you intend to submit.
- Once you decide, read the journal's "Instructions for authors" and peruse some published papers to acquaint yourself with the journal's style.
- Be cautious about using web sites as references - anyone can put just about anything on a web site, and you have no sure way of knowing if it is truth or fiction. If you are citing an on line journal, use the journal citation (name, volume, year, page numbers).



Always pay attention to spelling, clarity and appropriateness of sentences and phrases. For example:

**Giant urinary bladder calculus presentation in modern era: a rare case report**

**Abstract**

Vesical calculus is one of the oldest problems in surgery.<sup>(1)</sup> urinary bladder stone is not uncommon entity. In modern medical science huge urinary bladder stone is rarest phenomena due disease related symptomatology awareness, newer investigated technique e.g. radiological, Ultrasound, endoscopy, but It can be present huge stone as in this case report. Here we report a rarest case of giant urinary bladder stone (weight 482 gram) in 25 year old man.

**Key words:** urinary bladder stone, giant, 482 gram.

**Introduction**

Vesical calculi refer to the presence of stones or calcified materials in the bladder . Prolong stasis. infection. increased concentration of urine, bladder diverticula etc. is causative of urinary bladder stone. Bladder stone may be primary (within urinary bladder) or secondary ( from kidney or ureter). Approximately 95% of bladder stone found in male. The most common type of vesical stone in adults is composed of uric acid (>50%). Less frequently, composed of calcium oxalate, calcium phosphate, ammonium urate, cysteine, or magnesium ammonium phosphate (when associated with infection)<sup>2,3</sup>



# Conclusion

To conclude...

- ❑ Following simple authors' guidelines can drastically improve your paper.
- ❑ The feedback you get from others will in turn improve your paper. Every review is gold dust.

*Be grateful for criticism as well as praise.*





**Thank you very much**