

Research methodology and Bio-statistics

Selection of Research Topic



What is a Research Topic?

- A research topic is the specific subject or issue that a researcher wants to study or investigate.
- In pharmacological screening, this could relate to testing new drugs, understanding how certain compounds work, or comparing drug effects.

How to Select a Research Topic?

1. Interest and Curiosity

- The researcher should choose something they are genuinely curious about.
- It keeps them motivated during long-term research.

2. Relevance to the Field

- The topic must be related to the field of pharmacology or drug testing.
- For example, it could focus on discovering anti-inflammatory effects of a new compound.

3. Availability of Resources

- The researcher should have access to the required equipment, animals, chemicals, and lab facilities needed to perform the experiments.

4. Novelty and Innovation

- The topic should explore something new or offer a new way of solving an existing problem.

- It should not simply repeat what has already been done unless there's a strong reason for re-validation.

5. Feasibility and Ethics

- The project should be doable within time, budget, and ethical boundaries.
- For example, some experiments on animals or humans need proper ethical approval.

6. Literature Gap

- The researcher should find a gap in existing research – something that hasn't been studied yet or is not well understood.

Example in Pharmacological Screening:

- A researcher might choose a topic like: "Evaluation of anti-anxiety activity of a newly synthesized herbal compound in mice."

Review of Literature

What is Literature Review?

- A literature review is a process where the researcher reads and studies previously published research work related to their topic.
- It helps them understand what has already been done, what is known, and what questions are still unanswered.

Why is it Important?

- **Avoid Duplication:** It prevents the researcher from doing the same work that has already been done.
- **Identify Knowledge Gaps:** Helps find what areas need more research.
- **Develop Hypothesis:** Provides information to build a research question or hypothesis.
- **Design Better Studies:** Helps to learn from others' methods and results, so the researcher can design a more effective and accurate study.

Sources of Literature:

- **Scientific Journals:** Such as *Indian Journal of Pharmacology*, *Nature*, *Journal of Ethnopharmacology*, etc.
- **Textbooks:** Standard pharmacology books like *Goodman & Gilman*, *Rang & Dale*.
- **Online Databases:** PubMed, ScienceDirect, Scopus, Google Scholar, etc.
- **Theses and Dissertations:** From university libraries.

How to Perform a Literature Review:

1. **Search Using Keywords:** Use specific terms related to the topic.

2. **Select Relevant Articles:** Read abstracts and pick full papers that are useful.
3. **Summarize Findings:** Note down important results, methods, and gaps.
4. **Organize Information:** Make a structured summary to refer during the study.

Example in Pharmacological Screening:

- For the topic "Evaluation of anti-anxiety activity of a new herbal compound," the researcher would look for past studies on anti-anxiety drugs, herbal medicines with similar properties, and experimental models used to test such drugs in animals.

Research Hypothesis

- A **research hypothesis** is a proposed explanation or prediction that sets the direction for scientific research.
- It is tested through experiments or observations.

Types of Hypotheses:



1. Null Hypothesis (H_0):

- States that there is **no effect** or **no difference**.
- **Example:** "The new herbal compound has no anti-anxiety effect."

2. Alternative Hypothesis (H_1 or H_a):

- States that there **is an effect** or **a difference**.
- **Example:** "The new herbal compound has significant anti-anxiety effect."

Purpose of Hypotheses:

- The goal of an experiment is to **collect data** that either:
 - **Rejects the null hypothesis** (indicating a significant effect), or
 - **Fails to reject the null** (no significant evidence of an effect).

Study Design

- A **study design** is the detailed plan or blueprint for conducting research.
- It ensures valid, unbiased, and reproducible results.



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