HANDBOOK OF RESEARCH METHODOLOGY

Book · August 2017

CITATIONS
85

READS
994,144

2 authors:

Dr. Shanti Bhushan Mishra
United Institute of Pharmacy, Dr. APJ Abdul Kalam Technical University, Lucknow, India
99 PUBLICATIONS **779** CITATIONS
SEE PROFILE

Dr. Shashi Alok
Institute of Pharmacy
74 PUBLICATIONS **1,164** CITATIONS
SEE PROFILE

HANDBOOK OF RESEARCH METHODOLOGY

A COMPENDIUM FOR SCHOLARS & RESEARCHERS

Dr. SHANTI BHUSHAN MISHRA
Dr. SHASHI ALOK

Handbook of
Research Methodology

Publishing-in-support-of,

EDUCREATION PUBLISHING

RZ 94, Sector - 6, Dwarka, New Delhi - 110075
Shubham Vihar, Mangla, Bilaspur, Chhattisgarh - 495001

Website: *www.educreation.in*

ISBN: 978-1-5457-0340-3

Price: ₹ 244.00

Printed in India

Handbook of Research Methodology

A Compendium for Scholars & Researchers

(Based on revised syllabus of research methodology of various universities)

Dr. Shanti Bhushan Mishra
Dr. Shashi Alok

EDUCREATION PUBLISHING
(Since 2011)
www.educreation.in

ABOUT THE AUTHOR

Dr. Shanti Bhushan Mishra
M. Pharm., PhD
Associate Professor
United Institute of Pharmacy
Naini, Allahabad-10 (India)
Email: shantipharma15@gmail.com

Dr. Shanti Bhushan Mishra is serving as Associate Professor at United Institute of Pharmacy, Allahabad where he has been since 2010. He received his degree of Bachelor of Science (B.Sc.) from Lucknow University, Lucknow and Bachelor of Pharmacy (B. Pharm.) from Bundelkhand University Jhansi, India. Gold Medalist in Post graduation (M. Pharm.) from Vinayaka Mission University Salem, Tamilnadu and PhD from Sam Higginbottom Institute of Agriculture, Technology & Sciences (SHIATS), Allahabad. Major contribution has been in the field of Diabetes especially engaged in investigating on natural antioxidant from botanical sources and their role in diabetes management. His research interests lie in the area of pharmacological screening of herbal drugs, case studies, toxicity testing of natural products, isolation of phyto-constituents from plants, ranging from theory to design to implementation. He has collaborated actively with researchers in several other disciplines of pharmaceutical science and nanotechnology. Presently he is holding the positions of consultant editor of International Journal of Pharmaceutical Sciences and Research (IJPSR), Journal of Pharmaceutical & Biomedical research and International Journal of Therapeutic Application. He has selected as nominee of CPCSEA (Committee for the purpose of control and supervision of experiments on animals) under ministry of environment, forest and climate change government of India. He has published 50 research papers in national and international

journals of repute. He has presented 28 papers in various national and international conferences as invited speaker and resource person. He has three books and one book chapter in his credit. He is lifetime member of Association of Pharmaceutical Teachers of India, Indian Science Congress Association Kolkata, Societa Italo-Latino Americana de Etnomedicina, Costa Rica and American Chemical Society USA.

ABOUT THE AUTHOR

Dr. Shashi Alok
MBA, M. Pharm., PhD
Assistant Professor
Institute of Pharmacy
Bundelkhand University
Jhansi (U.P.), India
Email: shashialok83@gmail.com

Dr. Shashi Alok completed his B. Pharm, M. Pharma in Pharmacognosy from Institute of Pharmacy, Bundelkhand University, Jhansi (U.P.), India and M.B.A. in Pharmaceutical Marketing from IIPM Lucknow (U.P.), India. His Ph.D. degree in Pharmaceutical Sciences from Sam Higginbottom Institute of Agriculture, Technology & Sciences (SHIATS), Allahabad, U.P., India. He served as an Assistant Professor in Institute of Pharmacy, Bundelkhand University Jhansi (U.P.), India. His present research projects are focused on phytopharmacological work on active isolated constituents from Indian folklore medicine directed to explore their therapeutic potential and attempting on formulation of standardized product by following the modern herbal Ayurvedic monographs and international guidelines. His field of research focuses on Natural Products Chemistry, Pharmacognosy, pharmacological screening and standardization method development for herbals. He has more than 80 National and International publications in his credit, 1 Indian patent and also contributed in 3 book series. He is having more than 10 years of experience in research and teaching viz. Pharmacognosy in graduate and post graduate departments. He is supervising a number of students in post graduate and under graduate under his active supervision. He is External Referee for Ph. D at the University of Otago, New Zealand.

He is an Editor-in-Chief, International Journal of Pharmaceutical Sciences and Research, International Journal of Pharmacognosy and International Journal of Life Sciences and Review. He is also serving the international scientific community by extending expertise as Editorial Board member, reviewer and referee in number of journal Elsevier and Academic Journals. He is life member of APTI, FSPSR, FHAS and received fellow ship from Society of Pharmaceutical Sciences and Research and Society of Hind agriculture. He is also Member of International Linking Association, Inc (PILA) – USA. He has delivered many invited talk in different national and International conference. He has received Rashtriya Gaurav Award, Rajiv Gandhi Excellence award and Best Citizens of India in 2015. He has contributed as an invited Speaker in various national and international conferences. He has delivered an invited talk as a speaker at International Conference, Las Vegas, USA. He is special guest from India in Oman Pharmaceutical Conference 2015 at Oman Medical College, Muscat, Oman. He is specialist of development of noble phytochemicals, Bioassay guided fractionation of active phytoconstituents, modern chromatography and Histopathological studies.

Dedicated to
our lovely daughters
AARADHYA
S. B. Mishra
&
HARSHIKA
Shashi Alok

PREFACE

Research methodology is taught as a supporting subject in several ways in many academic disciplines such as health, education, psychology, social work, nursing, public health, library studies, marketing research and pharmaceutical sciences. The core philosophical base for this book comes from my conviction that, although these disciplines vary in content, their broad approach to a research enquiry is similar. This book, therefore, is addressed to these academic disciplines.

This textbook provides students with an understanding of the concepts and techniques of qualitative and quantitative research, grants for research, report writing, data collection etc. It uses simple examples to demystify complex theories and methodologies. This book is ideal for those readers with minimal knowledge of re-search as well as for those readers with intermediate knowledge who need a quick refresher regarding particular aspects of research design and methodology. For those readers with an advanced knowledge of research design and methodology, this book can be used as a concise summary of basic research techniques and principles Over the decades there has been a great deal of discussion on what constitutes research, how it should be conducted and whether certain methods are ‘better’ than others. Although we have touched upon some of these issues in the relevant chapters, it is not possible or desirable to go into any greater detail in this book. Therefore, we have included every aspect of research in the relevant chapters. This well-organized book deals with the variety of research methods used in management and social sciences, with particular emphasis on the pharmacy course curriculum.

A Handbook of Research Methodology is recommended for use in undergraduate and postgraduate courses focusing on research methodologies in various disciplines.

Authors

“If you steal from one author it's plagiarism; if you steal from many it's research.”

- Wilson Mizner

CONTENT LIST

1

Fundamentals of Research

Research Methods Versus Methodology

Research methods include all the techniques and methods which have been taken for conducting research where as research methodology is the approach in which research troubles are solved thoroughly. It is a science of studying how research is conducted systematically. In this field the researcher explains himself with the different steps generally taken to study a research problem. Hence, the scientific approach which is adopted for conducting a research is called methodology.

Meaning of Research

The term Research is related to seek out the information and knowledge on a particular topic or subject. In other words, research is an art of systematic investigation. Someone says that necessity is mother of all the inventions and the person engaged in this scientific investigation can be termed as research.

Research is a pedagogic action the term should be used in a technical sense. According to Clifford Woody research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis.

Objectives of Research

The major aim of any type of research is to find out the reality and facts which is unknown and which has not been exposed. Although each research activity has its own particular reason, the objectives of research can be grouped into the following categories :

1. To achieve skillfulness with a trend or to get novel opinions into it (research with this objective can be termed as exploratory or formulative);
2. To find out the characteristics of a particular character, condition or a grouping (research with this objective can be termed as descriptive research);
3. To establish the relationship with which something occur or with which it is related with something else (research with this objective are known as diagnostic research);
4. To test a hypothesis of a reasonable liaison between different variables (this type of research can be grouped into hypothesis-testing research).

Types of Research

The basic types of research are as follows:

(i) ***Descriptive vs. Analytical:*** *Descriptive research* consists of survey and fact-finding investigation of different kinds. The main purpose of descriptive research is explanation of the set of circumstances as it is present as such. The term Ex post facto research has been used to elaborate this type of research in different areas or subjects of research. The main feature of this method is that the scientist does not have direct control over the variables; he can only report what is happening or what has happened. For example, why peoples of the south side are suffering from lung cancer as compared to north-side neighbors and investigation revealed that south side persons have wood burning stoves and fire places, the researcher could hypothesize the reason that the wood smoke is a factor of lung cancer. The

techniques used in descriptive research are can be of all kinds like survey methods, comparative and correlational methods etc. On the other hand, in analytical research, , the researcher could be use the facts, information, data which is already available, and analyze these sources to make a hypothesis to evaluation of the material.

(ii) Applied vs. Fundamental: Applied research refers to finding a solution for specific, practical problem facing by an individual, society or an industrial or business organization, for example how to abolish hate crime, what are the ways to market a product, what is causing increased poverty etc. whereas *fundamental research* is mainly concerned with overview and with the formulation of a theory. This is pure and basic type of research, for example an investigation looking for whether stress levels influence how often students engage in academic cheating or how caffeine consumption impacts the brain.

Thus, the main aim of applied research is to find out a solution for some critical practical problem, whereas basic research is handling towards finding information that has a wide sense of applications to the already existing organized body of scientific knowledge.

(iii) *Quantitative vs. Qualitative:* In natural sciences and social sciences, quantitative research is based on the aspect of quantity or extent. It is related to object that can be expressed in terms of quantity or something that can be counted. Such type of research involve systematic experimental analysis of observable phenomenon via statistical, mathematical or computational techniques in numerical form such as statistics, percentages, etc. whereas Qualitative research, , is concerned with qualitative phenomenon, i.e., relating to quality or variety. Such type of research is typically descriptive and harder to analyze than quantitative data. Qualitative research involves looking in-depth at non-numerical data. It is more naturalistic or anthropological.

(iv) *Conceptual vs. Empirical:* Conceptual research is that related to some abstract idea(s) or theory. It focuses on the concept and

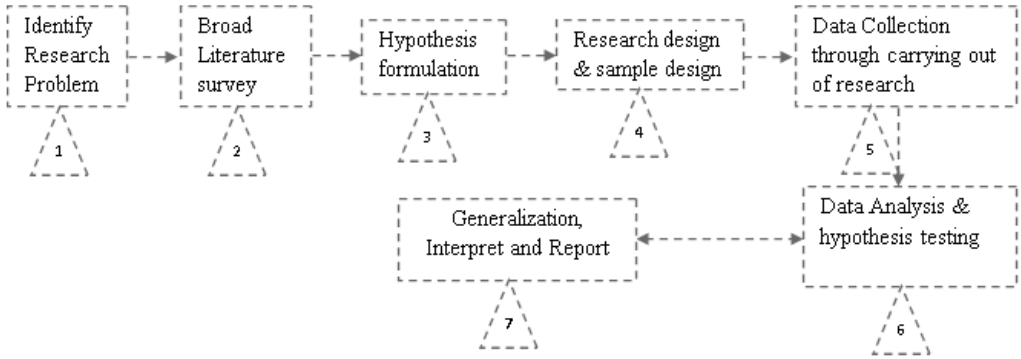
theory that explain the concerned theory being studied. It is generally used by logicians, philosophers and theorist to develop new concepts or to again understand the existing ones. On the other hand, empirical research relies on experience or observation alone. It is a way of gaining knowledge by means of direct and indirect observation or experience. We can also refer it as experimental type of research. In such a research it is necessary to get the facts and data firstly, their source, and then actively engaged to doing certain things to stimulate the production of desired information.

(v) ***Some Other Types of Research:*** Other types of research may be of different types rather than above stated types like form the point of view of time one-time research or longitudinal research. In the former case the research is restricted to a single time-period, while in the latter case the research is carried on over several time-periods. Research can be field-setting research or laboratory research or model research, which will depend upon the environment in which it is to be carried out. Research may be understood as clinical or diagnostic research. Such research follows case-study methods or exhaustively approaches to reach the basic reasons behind the problems. The research may be exploratory or it may be formalized. The objective of exploratory research is the creation of hypotheses rather than their testing, whereas formalized research are those with significant structure and with specific hypotheses to be tested. The term historical research is refers to that which make use of historical resource like documents, papers, leaflets remains, etc. to study events or thoughts of the past, including the philosophy of persons and groups at any point of time. Research can also be classified as conclusion-oriented and decision-oriented. While doing conclusion oriented research, a researcher having freethinking to choose a problem, redesign the queries as he proceeds and is prepared to conceptualize as he wants. Decision-oriented research is always for the need of a decision maker and the researcher in this case is not free to get on research according to his own preference.

Research Process

Research process consists of sequence of actions or steps necessary to effectively carry out research and the desired progression of these steps. The chart shown in Figure 1represents a research process.

Fig. 1: Flow chart of research process



The figure shows that the research process having a number of closely related actions, as shown from step 1 to 7. But these activities should be following in a strictly prescribed sequence otherwise researcher may face the problem in completion of the research. In the research process, each step is specific and they are separate and distinct from each other. However, the following order relating to various steps provides a useful procedural instruction regarding the research process:

1) Identification of research problem
2) Broad literature survey
3) Hypothesis formulation
4) Preparation of research design
5) Determining sample design
6) Data collection
7) Analysis of data
8) Hypothesis testing
9) Generalizations and interpretation
10) Preparation of the report or presentation of the results,

A brief description of the above stated steps are as follows:

1. Identification of research problem: There are two types of research problems like, those which relate to states of nature means that denote the hypothetical conditions of what the lives of people might have been like before societies came into existence and those which relate to relationships between different variables. Initially the researcher must recognize the problem he wants to study, i.e., he must decide the general area of interest or part of a subject-matter that he would like to inquire into. At the onset the problem may be discussed in a broad way and then the doubts, if any, relating to the problem may be resolved. Then, the probability of a particular clarification has to be considered before working on formulation of the problem. Basically two steps are involved in formulating the research problem, viz., understanding the problem systematically, and reshape the same into significant terms from an analytical point of view.

The most excellent way of understanding the problem is to discuss it with contemporaries or with those having some knowledge in the related matter. In an academic institution the researcher can take the assistance from a guide who is usually an experienced man and has several research problems in his mind. In private business units or in governmental organizations, the problem is usually allocate by the administrative agencies with whom the researcher can discuss the problem originally that how it is came about and what reflections are involved in its possible clarification.

2. Broad literature survey: After the identification of research problem, the researcher must at study all available literature to get himself familiar with the selected problem. He may review two types of literature first is the conceptual literature which is related to the concepts and theories, and second is the empirical literature which consisting of previous studies similar to the proposed research problem. The researcher should undertake vast literature survey concerned with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place where researcher can get the

information or knowledge. Academic journals, conference proceedings, government reports, books etc., must be hit depending on the nature of the problem. After this the researcher revise the problem into analytical or operational terms i.e., to put the problem in as specific terms as possible. This assignment of formulating, or defining, a research problem is a important step in the entire research process. Once the problem is formulated, a synopsis of it should be written down.

3. Hypotheses formulation: After the literature survey, researcher should make a hypothesis or working hypothesis. Working hypothesis is a guess made to test the logical or empirical outcome of a research. A hypothesis assists to explain the research problem and objective into a comprehensive explanation or prediction of the expected results of the study. Hypothesis is derived from the research problem, literature review and conceptual framework. Since Hypothesis is to be tested therefore it should be very specific and limited to the piece of research. It sharpens the researcher's thinking and focus on the important facts of the problem.

Hypothesis formulation could be done by using the following approaches:

(a) Discussions with colleagues and experts about the research problem, its source, cause and the objectives in search of a solution;

(b) Assessment of data and records,

(c) Evaluation of similar previous studies in the area similar problems; and

(d) Personal investigation which involves original field survey

Thus, any hypotheses take place as a result of a-prior thinking about the subject, assessment of the available data and material including related previous studies. Formulation of working hypotheses is a basic step of any research process.

4. Preparation of research design: A good research design will be prepared if a research problem should be stated clearly. In other words, the purpose of research design is refers as general procedure that you choose to combine the various components of

the study in a consistent and logical way. It comprises the outline for the collection, measurement, and analysis of data. A flexible research design which offers the opportunity for allowing the different aspects of a problem is considered suitable if the purpose of the research study is to be clear. There are several research designs, such as, Descriptive (e.g., case-study, naturalistic observation, survey), Correlational (e.g., case-control study, observational study), Semi-experimental (e.g., field experiment, quasi-experiment), Experimental (experiment with random assignment), Review (literature review, systematic review) and Meta-analytic (meta-analysis) out of which the researcher should select one for his task.

5. Determining sample design: Every object that involve in any type of inquiry constitute a 'universe' or 'population'. A complete detail of any object in the 'population' is known as a census inquiry. It can be supposed that in such type of inquiry all the items are covered and not a single element is left and highest accuracy is obtained. But in practical way this may not be true because a single element of bias in such inquiry will get larger the number of observations increases. Moreover, there is no way of scrutiny the element of bias or its level except through a resurvey or use of sample checks. Besides, such type of inquiry comprises a lot of time, money and energy. Apart from this, census inquiry is not possible practically under many conditions. For example, blood sugar testing is done only on sample basis. Hence, quite often we select only a few items from the population for our study purposes. The selection of items in such type of manner is technically called a sample.

The researcher must decide the way of selecting a sample or choose a sample design for his study. In other words, a sample design is a exact sketch determined prior to any type of data collection for obtaining a sample from a given universe. There are two types of sampling: non-probability and probability sampling. Non-probability sampling uses a subjective method of selecting units from a universe, and is generally easy, quick, and economical. Therefore, it is useful to perform preliminary studies, focus groups or follow-up studies. Probability samples are based

on simple random sampling, stratified sampling, systematic sampling, cluster/area sampling whereas non-probability samples are those based on straightforward sampling, judgement sampling and quota sampling techniques. There is brief description of some important sample designs is as follows:

(i) *Deliberate sampling:* Deliberate sampling is also called as non-probability or purposive sampling. This sampling method consists of purposive selection of particular items of the universe to represent a sample. When samples are selected from a population on the basis of ease of access, it can be called *convenience sampling*. If a researcher wants to collect the data from students, he may select a fixed number of universities and colleges to conduct the interviews. This is a simple example of convenience sample. Sometimes this type of sampling may give biased results particularly when the universe is not homogeneous. On the other hand, in *judgement sampling* which is based on the judgement of researcher and used for selecting items from a given population. For example, a judgement sample of office staff might be taken to secure reactions to a new rule of office. Judgement sampling is used regularly in qualitative research.

(ii) *Simple random sampling:* This type of sampling is also called as probability sampling or chance sampling where each item in the population has an equal chance of inclusion in the sample and each sample having the probability of being selected in the sampling procedure. For example, names of 20 employees being selected out of 250 employees in a company. In this case, the population is all 250 employees, and the sample is random because each employee has an equal chance of being chosen. There are basically three methods to conduct a random sampling. If we select a sample of 300 items from a population of 2,000 items, then we can write up the names of all the 2,000 items on slips of paper and conduct a lottery. This is called Lottery method. The second method of random sampling is using a random number table and third method is by using the computer in which the computer is used for selecting a sample of prize- winners, a sample of Hajj applicants,

and a sample of applicants for residential plots and for various other purposes.

(iii) *Systematic sampling:* Whenever a researcher choose some specific name or number from the population then this type of sampling is known as systematic sampling In some example the most practical way of sampling is to select every 10th name in a index, every 15th shop on single side of a street etc. An component of unpredictability is generally commenced into this type of sampling by using random numbers to pick and choose up the item with which to start. This method is helpful when sampling frame is available in the form of a list. In such type of sample design the practice of selection process begins by picking some random point in the list and then every *n*th item is selected until the desired number is secured.

(iv) *Stratified sampling:* In stratified sampling the researcher divides the population into separate groups, called strata or we can say that Stratification is the process of dividing members of the population into homogeneous subgroups before sampling. In this technique, the population is devided into a number of non-overlapping subpopulations or strata and sample elements are selected from each stratum. If the item selected from each stratum is based on simple random sampling technique in complete process of sampling means first stratification and then simple random sampling, this type of sampling is known as *stratified random sampling*.

(v) *Quota sampling:* A sampling method of collecting the data from a group Quota sampling is different from stratified sampling, because in a stratified sample personnel within each stratum are chosen at random. Quota sampling attains a representative age distribution, but it is not a random sample, because the sampling frame is unknown. In stratified sampling the cost of taking random samples from individual strata is very expensive so that interviewers are simply given quota for the selection of items from sample of different strata and everything is being left to the

HANDBOOK OF RESEARCH METHODOLOGY

This comprehensive Handbook is aimed at both academic researchers and practitioners in the field of research. The book's 8 chapters, provide in-depth coverage of research methods based on the revised syllabus of various universities especially considering the students of under graduate, post graduate and doctorate level. This book is a product of extensive literature survey made by the authors. The authors have made sincere efforts to write the book in simple language. The book comprises all the aspects according to new syllabus of PCI and APJ Abdul Kalam Technical University, Lucknow. Though this book is intended for the use of pharmacy students of any level yet it can also be useful to students of applied fields and medical students. The book deals with interdisciplinary fields such as finding research problems, writing research proposals, obtaining funds for research, selecting research designs, searching the literature and review, collection of data and analysis, preparation of thesis, writing research papers for journals, citation and listing of references, preparation of visual materials, oral and poster presentation in conferences, minutes of meetings, and ethical issues in research. At the end of every chapter and book some questions related to chapter have been mentioned for the support of students to understand the subject. Valuable suggestions for the improvement of this book are most welcome.

You may reach author at:
✉shantibhushan Mishra@educreation.in

Dr. Shanti Bhushan Mishra

Dr. Shashi Alok

EDUCREATION
PUBLISHING (Delhi)
www.educreation.in

Also available as an eBook
ACADEMIC
ISBN 978-1-5457-0340-3
9 781545 703403 >