Centre for Post Graduate Studies and Research in Ayurved of
Tilak Ayurved Mahavidyalaya, Pune
PRE-M.D./M.S.
Sub: Research Methodology and Medical Statistics
Admitted Batch 2023-24
ATP
Part A – Research Methodology

S. No.	Topic	Name of the Faculty	Lecture Hours
1.	**Introduction to Research**		
A.	Definition of the term research	Dr.Yoginee Patil	3 hrs
B.	Definition of the term anusandhan		
C.	Need of research in the field of Ayurveda		
2.	**General guidelines and steps in the research process**		22 hrs
A	Selection of the research problem	Dr.Vinaya Dixit	
B	Literature review: different methods with their advantages and limitations	Dr Yoginee Patil	
	Literature review: with computer databases with their advantages and limitations	Dr Ashwini Bodade / Dr Taranoom Patel	
C	Defining research problem and formulation of hypothesis	Dr Vinaya Dixit	
D	Defining general and specific objectives		
E	Research design: observational and interventional, descriptive and analytical, preclinical and clinical, qualitative and quantitative	Dr Manjiri Deshpande / Dr Aishwarya Ranade	
F	Sample design		
G	Collection of the data	Dr Ashwini Bodade	
H	Analysis of data.		
I	Generalization and interpretation, evaluation and assessment of hypothesis	Dr Manjiri Deshpande	
J	Ethical aspects related to human and animal experimentation	Dr Apoorva Sangoram	
K	Information about Institutional Ethics Committee (IEC) and Animal Ethics Committee (AEC) and their functions. Procedure to obtain clearance from respective committees, including filling up of the consent forms and information sheets		
	Publication ethics.	Dr Taranoom Patel	
3.	Preparation of research proposals in different disciplines for submission to funding agencies taking EMR-AYUSH scheme as a model.	Dr.Mihir Hajarnavis	
4.	**Scientific writing and publication skills**		8 hrs
a	Familiarization with publication guidelines- Journal specific and CONSORT guidelines	Dr.Minakshi Randive	
b	Different types of referencing and bibliography		
c	Thesis/Dissertation: contents and structure	Dr Ashwini Bodade	

d	Research articles structuring: Introduction, Methods, Results and Discussions (IMRAD	Dr Taranoom Patel	
5.	**Classical Methods of Research.**		**16 hrs**
a	Concept of Pratyakshadi Pramana Pariksha, their types and application for Research in Ayurveda	Dr Taranoom Patel	
b	Dravya-, Guna-, Karma-Parikshana Paddhati	Dr Apoorva Sangoram	
c	Aushadhi-yog Parikshana Paddhati	Dr Vinaya Dixit	
d	Swastha, Pariksha Paddhati	Dr Mihir Hajarnavis	
e	Atura Pariksha Paddhati	Dr Manjiri Deshpande	
f	Dashvidha Parikshya Bhava		
g	Tadvidya sambhasha, vadmarga and tantrayukti	Dr Yoginee Patil	
6.	Comparison between methods of research in Ayurveda (Pratigya, Hetu, Udaharana, Upanaya, Nigaman) and contemporary methods in health sciences.	Dr Mihir Hajarnavis / Dr Aishwarya Ranade	
7.	**Different fields of Research in Ayurveda**		**8 hrs.**
a	Fundamental research on concepts of Ayurveda	Dr Taranoom Patel	
b	Panchamahabhuta and tridosha		
c	Concepts of rasa, guna, virya, vipak, prabhav and karma	Dr Apoorva Sangoram	
d	Concept of prakriti-saradi bhava, ojas, srotas, agni, aam and koshtha	Dr Minakshi Randive/ Dr Taranoom Patel	
8.	**Literary Research-**		**6 hrs**
a	Introduction to manuscriptology: Definition and scope. Collection, conservation, cataloguing.	Dr. Madhura Kulkarni	
b	Data mining techniques, searching methods for new literature; search of new concepts in the available literature.	Guest lecture	
c	Methods for searching internal and external evidences about authors, concepts and development of particular body of knowledge		
9.	**Drug Research (Laboratory-based)-**		**8 hrs.**
a	Drug sources: plant, animal and mineral. Methods of drug identification	Dr Apoorva Sangoram	
b	Quality control and standardization aspects: Basic knowledge of Pharmacopoeial standards and parameters as set by Ayurvedic Pharmacopoeia of India.	Dr Apoorva Sangoram / Dr.Vinaya Dixit	
c	Information on WHO guidelines for standardization of herbal preparations. Good Manufacturing Practices (GMP)	Dr Yoginee Patil	
	Good Laboratory Practices (GLP).	Dr Manjiri Deshpande	
10.	**Safety aspects:**		**2 hrs.**
	Protocols for assessing acute, sub-acute and chronic toxicity	Dr Apoorva Sangoram	

	studies. Familiarization with AYUSH guidelines (Rule 170), CDCSO and OECD guidelines.			
11.	**Introduction to latest Trends in Drug Discovery and Drug Development**	Guest Lecture	6 hrs.	
	Brief information on the traditional drug discovery process			
	Brief information on the latest trends in the Drug Discovery process through employment of rational approach techniques; anti-sense approach, use of micro and macro-arrays, cell culture-based assays, use of concepts of systems biology and network physiology			
	Brief introduction to the process of Drug development			
12.	**Clinical research:**		11hrs.	
a	Introduction to Clinical Research Methodology identifying the priority areas of Ayurveda Basic knowledge of the following: - Observational and Interventional studies	Dr Manjiri Deshpande/ Dr Minakshi Randive/ Dr Mihir Hajarnavis / Dr Aishwarya Ranade		
b	Descriptive & Analytical studies			
c	Longitudinal & Cross-sectional studies			
d	Prospective & Retrospectives studies Cohort studies			
e	Randomized Controlled Trials (RCT) & their types			
f	Single-case design, case control studies, ethnographic studies, black box design, cross-over design, factorial design.			
g	Errors and bias in research.			
h	New concepts in clinical trial- Adaptive clinical trials/ Good clinical practices (GCP)			
i	Phases of Clinical studies: 0,1,2,3, and 4			
	Survey studies -	Dr Mihir Hajarnavis	2 hrs.	
	Methodology, types, utility and analysis of Qualitative Research methods. Concepts of in-depth interview and Focus Group Discussion.			
	Questionnaire designing	Dr. Sangeeta Salvi	1 hr	
13.	Pharmacovigilance for ASU drugs. Need, scope and aims & objectives. National Pharmacovigilance Programme for ASU drugs.	Dr Apoorva Sangoram	2 hrs.	
14.	Introduction to bioinformatics, scope of bioinformatics, role of computers in biology. Introduction to Data base- Pub med, Medlar and Scopus. Accession of databases	Dr Taranoom Patel	2 hrs.	
15.	Intellectual Property Rights- Different aspect and steps in patenting. Information on Traditional Knowledge Digital Library (TKDL).	Dr. Aishwarya Ranade	2 hrs.	

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Part B- Medical Statistics

S. No.	Topic	Name of the Faculty	
1.	Definition of Statistics: Concepts, relevance and general applications of Biostatistics in Ayurveda	Dr Mihir Hajarnavis	2
2.	Collection, classification, presentation, analysis and interpretation of data (Definition, utility and methods)	Dr Mihir Hajarnavis	3
3.	Scales of Measurements - nominal, ordinal, interval and ratio scales. Types of variables – Continuous, discrete, dependent and independent variables. Type of series – Simple, Continuous and Discrete	Dr Mihir Hajarnavis	5
4.	Measures of Central tendency – Mean, Median and Mode	Dr Mihir Hajarnavis	2
5.	Variability: Types and measures of variability – Range, Quartile deviation, Percentile, Mean deviation and Standard deviation	Dr Mihir Hajarnavis / Dr Aishwarya Ranade	5
6.	Probability: Definitions, types and laws of probability,	Dr. Manjiri Deshpande	2
7.	Normal distribution: Concept and Properties, Sampling distribution, Standard Error, Confidence Interval and its application in interpretation of results and normal probability curve.	Dr Mihir Hajarnavis	5
8.	Fundamentals of testing of hypotheses: Null and alternate hypotheses, type I and type 2 errors. Tests of significance: Parametric and Non-Parametric tests, level of significance and power of the test, 'P' value and its interpretation, statistical significance and clinical significance	Shri Sagar Khandagale	6
9.	Univariate analysis of categorical data: Confidence interval of incidence and prevalence, Odds ratio, relative risk and Risk difference, and their confidence intervals	Shri Sagar Khandagale	6

10.	Parametric tests: 'Z' test, Student's 't' test: paired and unpaired, 'F' test, Analysis of variance(ANOVA) test, repeated measures analysis of variance	Shri Sagar Khandagale	6
11.	Non parametric methods: Chi-square test, Fisher's exact test, McNemar's test, Wilcoxon test, Mann-Whitney U test, Kruskall – Wallis with relevant post hoc tests (Dunn)	Shri Sagar Khandagale	6
12.	Correlation and regression analysis: Concept, properties, computation and applications of correlation, Simple linear correlation, KarlPearson's correlation co-efficient, Spearman's rank correlation. Regression- simple and multiple	Shri Sagar Khandagale	8
13.	Population and sample. Advantages of sampling, Random (Probability) and non-random (non-probability) sampling. Merits of random sampling. Random sampling methods- simple random, stratified, systematic, cluster and multiphase sampling. Concept, logic and requirement of sample sizecomputation, computation of sample size for comparing two means, two proportions, estimating mean and proportions	Shri Sagar Khandagale	8
14.	Vital statistics and Demography: computation and applications - Rate, Ratio, Proportion, Mortality and fertility rates, Attack rate and hospital-related statistics	Dr Mihir Hajarnavis / Dr Aishwarya Ranade	4
15.	Familiarization with the use of Statistical software like SPSS/Graph Pad	Shri Sagar Khandagale	4
16	Presentations		8

Practicals

I-   Research Methodology

S. No.	Topic	Name of the Faculty
1.	**Pharmaceutical Chemistry** Familiarization and demonstration of common lab instruments for carrying out analysis as per API	Mrs. Vinaya Walimbe
2.	**Awareness of Chromatographic Techniques** Demonstration or Video clips of following: • Thin-layer chromatography (TLC). • Column chromatography (CC). • Flash chromatography (FC) • High-perfo High-performance thin-layer chromatography (HPTLC) • High Performance (Pressure) Liquid Chromatography (HPLC) • Gas Chromatography (GC, GLC)	Mrs. Vinaya Walimbe
3.	**Pharmacognosy**	Dr Apoorva Sangoram

		Drug identification as per API including organoleptic evaluation	
4.		**Pharmacology and toxicology** Familiarization and Demonstration of different techniques related to:-Drug administration techniques- oral and parenteral.	Guest lecture/ Visit to animal house / demonstrations
		Blood collection by orbital plexuses puncturing	
		Techniques of anaesthesia and euthanasia	
		Information about different types of laboratory animals used in experimental research	
		Familiarization and demonstration of techniques related to pharmacology and toxicology	
5		Biochemistry (Clinical)	Dr Minakshi Randive/ Dr Taranoom Patel / Dr Manjiri Deshpande/ Dr. Aishwarya Ranade
		Familiarization and demonstration of techniques related to basic instruments used in a clinical biochemistry laboratory – semi and fully automated clinical analyzers, electrolyte analyzer, ELISA-techniques, nephelometry. Demonstration of blood sugar estimation, lipid profiles, kidney function test, liver function test.HbA1, cystatin and microalbumin estimation by nephelometry or other suitable techniques. Interpretation of the results obtained in the light of the data on normal values.	
6		Clinical Pathology	Dr Manjiri Deshpande/ Dr. Aishwarya Ranade
		Familiarization and demonstration of techniques related to basic and advanced instruments used in abasic clinical Pathology lab. Auto cell counter, urine analyzer, ESR, microscopic examination of urine.	
7		**Imaging Sciences**	
		Familiarization and demonstration of techniques related to the imaging techniques. Video film demonstration of CT-Scan, MRI-scan and PET-scan.	Guest Lecture
8		Clinical protocol development	Dr Manjiri Deshpande
		II. MEDICAL STATISTICS	
1		Statistical exercise of examples from Topic number 4, 5, 8-12, 14, 15. Records to be prepared	Dr Mihir Hajarnavis/ Mr. Sagar Khandagale

Dr. Mihir Hajarnavis
Proffessor.

Principal
C.P.G.S.R.A
Tilak Ayurved Mahavidyalalya, Pune

I/c Principal
Tilak Ayurved Mahavidyalaya
Pune - 11