

Unit 10.1 MCQs Set 1

Results



#1. Q1. Which statement best describes the role of bioethics in research methodologies for Ayurveda?

- (A) It is irrelevant because Ayurveda is traditional and not subject to modern standards
- (B) It ensures informed consent, safety, and respect for participants in line with universal ethical guidelines
- (C) It only covers financial disclosures by researchers
- (D) It is handled solely by local healers without formal oversight

Bioethics in Ayurveda-based research safeguards participants' rights and welfare by ensuring informed consent and compliance with universal ethical standards.

#2. Q2. Fundamental principles-based research in Ayurveda generally attempts to:

- (A) Replace classical dosha concepts with purely biochemical terms
- (B) Investigate or validate classical notions (like Vata-Pitta-Kapha) using contemporary scientific approaches
- (C) Dismiss any link to Caraka or Suśruta Samhitā
- (D) Patent well-known home remedies without scientific study

Researchers often correlate traditional concepts with modern scientific models to preserve traditional frameworks while adding empirical validation.

#3. Q3. An important aspect of food- and drug-based research in Ayurveda is:

- (A) Bypassing safety checks because herbs are "always safe"
- (B) Evaluating nutritional and therapeutic claims for authenticity and ensuring compliance with modern health regulations
- (C) Only focusing on consumer taste preferences

(D) Relying solely on traditional anecdotal evidence without empirical testing

Modern research requires rigorous testing of safety, efficacy, and regulatory compliance, even for traditional remedies.

#4. Q4. Which is the incorrect statement about pre-clinical trials in Ayurveda?

- (A) They assess safety/toxicity in animal models before human trials
- (B) They are optional if the herb is cited in a classical text
- (C) They investigate pharmacological actions of extracts
- (D) They may explore potential mechanisms or dose ranges

Regardless of classical citations, modern regulatory standards require pre-clinical safety studies.

#5. Q5. (Fill in the blank) During clinical protocol designing in Ayurveda, _____ helps ensure each subject or group receives a defined intervention based on *doṣa* analysis or standard classification.

- (A) Random allocation of subjects
- (B) Blinding techniques
- (C) Methodology planning
- (D) Standardization of treatment protocols

Methodology planning defines specific procedures—including subject grouping and dosing—to ensure systematic study design.

#6. Q6. Which is not typically one of the “phases” of clinical trials for an Ayurvedic new product?

- (A) Phase I (safety in a small group)
- (B) Phase II (efficacy/dose refining)
- (C) Phase III (large-scale validation)
- (D) Phase V (immediate, indefinite marketing without supporting data)

Clinical trials are generally categorized as Phases I through IV; a “Phase V” as described does not exist.

#7. Q7. Various extraction methods are crucial because:

- (A) All phytoconstituents dissolve equally in water
- (B) Different solvents and techniques isolate specific compounds based on their polarity or volatility
- (C) Only hexane can extract all phytoconstituents from plants
- (D) Extraction methods are interchangeable regardless of chemical properties

The chemical properties of target compounds determine the optimal extraction method and solvent.

#8. Q8. Match the following extraction techniques with their descriptions: Soxhlet extraction; Maceration; Microwave-assisted extraction; Supercritical fluid extraction

- (A) 1-b, 2-a, 3-d, 4-c
- (B) 1-c, 2-a, 3-d, 4-b
- (C) 1-d, 2-b, 3-a, 4-c
- (D) 1-a, 2-c, 3-b, 4-d

Soxhlet extraction uses repeated solvent cycling in a heated chamber, maceration is simple soaking, microwave-assisted extraction uses microwave energy, and supercritical fluid extraction employs pressurized solvent conditions.

#9. Q9. (Fill in the blank) The principle of _____ guides the selection of a solvent (polar, semi-polar, or non-polar) for extracting target compounds from plants.

- (A) Solvent viscosity
- (B) Affinity index
- (C) Polarity
- (D) Molecular size

Polarity – the principle ‘like dissolves like’ – is key in selecting a suitable solvent for extraction.

#10. Q10. Purification of bioactive compounds through chromatography is performed because:

- (A) Single-step extractions yield completely pure compounds
- (B) Different compounds interact differently with the stationary and mobile phases, allowing effective fractionation
- (C) Chromatography has no role in herbal research
- (D) It is used only for analysis and not for purification

Chromatography separates compounds based on chemical interactions, enabling the isolation of active components from complex herbal extracts.

#11. Q11. Which approach identifies functional groups in phytochemicals by using color or precipitate formation?

- (A) GC-MS fragmentation
- (B) Simple chemical spot tests (e.g., Dragendorff's reagent for alkaloids)
- (C) Infrared spectroscopy
- (D) Thin-layer chromatography

Simple chemical spot tests are used to quickly identify the presence of specific groups, such as alkaloids, through colorimetric reactions.

#12. Q12. (Fill in the blank) In many spectroscopic methods, _____ is used to detect characteristic vibrational frequencies of functional groups in molecules.

- (A) UV-Vis spectroscopy
- (B) NMR spectroscopy
- (C) IR spectroscopy
- (D) Mass spectrometry

IR spectroscopy is the technique used to detect vibrational frequencies of chemical bonds, which helps identify functional groups.

#13. Q13. A major difference in clinical trials designed for Ayurveda is that they:

- (A) Observe doṣa-based subgroups and incorporate both classical and modern outcome measures
- (B) Use no controls or randomization
- (C) Rely solely on historical texts to determine outcomes
- (D) Ignore biochemical markers entirely

Ayurvedic clinical trials often integrate classical (doṣa-based) assessments with modern biomedical endpoints.

#14. Q14. For 'bioethics in Ayurveda research,' which statement is correct?

- (A) Ethical rules don't apply to herbal interventions
- (B) Informed consent, confidentiality, and risk-benefit analysis remain essential ethical requirements
- (C) Trials can bypass local ethics committees
- (D) Only international guidelines are followed, ignoring local oversight

Regardless of the tradition, ethical principles—such as informed consent—must be followed in all human research.

#15. Q15. If a new herbal-based formula lacks sufficient existing references, pre-clinical research should include:

- (A) No safety tests, based solely on its natural origin
- (B) Both acute and chronic toxicity studies in animal models to establish safety margins
- (C) Only efficacy studies without toxicity evaluation
- (D) Reliance exclusively on historical usage data

Rigorous pre-clinical toxicity studies are essential, even for formulations with a traditional background, to ensure safety before human trials.

#16. Q16. Match the following clinical trial phases with their descriptions: Phase I trial; Phase II trial; Phase III trial; Phase IV trial

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- (A) 1-a, 2-b, 3-d, 4-c
-
- (B) 1-b, 2-d, 3-c, 4-a
-
- (C) 1-d, 2-c, 3-b, 4-a
-
- (D) 1-b, 2-a, 3-d, 4-c

Phase I determines safety (b), Phase II refines dosage and examines preliminary efficacy (d), Phase III confirms efficacy in a large group (c), and Phase IV involves post-marketing surveillance (a).

#17. Q17. (Fill in the blank) _____ ensures that all data from clinical or pre-clinical studies are systematically recorded, stored, and analyzed for accurate conclusions.

-
- (A) Record keeping protocols
-
- (B) Data curation
-
- (C) Data management
-
- (D) Quality control systems

Effective data management is crucial for ensuring the integrity and reproducibility of research data.

#18. Q18. If an Ayurvedic researcher conducts a 'fundamental principle-based' study, a suitable example is:

-
- (A) Analyzing market trends for herbal supplements
-
- (B) Investigating how a specific herb influences pitta-related inflammatory markers, correlating findings with classical texts
-
- (C) Measuring the nutritional content of an herb
-
- (D) Using only modern clinical endpoints without reference to Ayurvedic principles

A fundamental principle-based study integrates classical Ayurvedic concepts with modern measurable outcomes.

#19. Q19. Identifying active leads in a polyherbal formulation commonly employs:

-
- (A) Simple solvent extraction without further separation
-
- (B) Bioassay-guided fractionation, where each fraction is tested for bioactivity
-
- (C) Random fractionation without systematic testing
-
- (D) Direct analysis of the crude extract without separation

Bioassay-guided fractionation is the systematic process of testing separated fractions for their bioactivity to identify the active leads.

#20. Q20. Which statement is incorrect about 'food-based research' in Ayurveda?

-
- (A) It examines the nutraceutical aspects of herbal foods
-
- (B) It can assess health benefits through controlled dietary interventions

- (C) It never requires any regulatory oversight
- (D) It might combine classical knowledge of rasas with modern nutritional science

Food-based research is subject to regulatory oversight, especially when health claims are made.

#21. Q21. Match the following extraction techniques with their descriptions: Maceration; Percolation; Reflux extraction; Ultrasound-assisted extraction

- (A) 1-b, 2-a, 3-d, 4-c
- (B) 1-a, 2-b, 3-c, 4-d
- (C) 1-d, 2-c, 3-b, 4-a
- (D) 1-a, 2-b, 3-d, 4-c

Maceration is simple soaking (a), percolation involves continuous solvent flow (b), reflux extraction uses a boiling cycle (d), and ultrasound-assisted extraction employs ultrasonic waves (c).

#22. Q22. (Multiple-choice, Fill in the blank) The _____ approach in Ayurveda-based research focuses first on clinically observed benefits and then investigates underlying mechanisms in the lab.

- (A) Forward translation
- (B) Translational research
- (C) Clinical-first approach
- (D) Reverse pharmacology

Reverse pharmacology starts with clinical observations and then explores lab mechanisms.

#23. Q23. 'Chromatographic purification' is important because:

- (A) It eliminates all impurities in one step
- (B) Ayurvedic herbs contain complex mixtures; isolating active compounds clarifies which constituents exert the therapeutic effect
- (C) It is used only for the quantification of compounds
- (D) It primarily provides a fingerprint for quality control rather than for purification

Chromatography separates the complex mixtures found in herbal extracts, helping identify the active components.

#24. Q24. If a new Ayurveda formula is tested in humans without prior toxicity or regulatory clearance, it may lead to:

- (A) A misconception that natural products are inherently safe
- (B) Ethical and legal violations, potentially endangering volunteers and damaging researcher credibility
- (C) Rapid, unregulated market approval

(D) Inconclusive results due to underpowered studies

Skipping toxicity and regulatory clearance leads to ethical and legal risks, endangering participants and compromising research credibility.

#25. Q25. Dragendorff's reagent is commonly used to detect:

(A) Carbohydrates
 (B) Alkaloids
 (C) Tannins
 (D) Proteins

Dragendorff's reagent reacts with alkaloids to form a characteristic colored precipitate.

#26. Q26. A typical reason for measuring 'particle size' in extracts or final formulations is:

(A) To determine the flavor profile of the extract
 (B) Because bioavailability may change if the constituents are finer or coarser, affecting dissolution and absorption
 (C) To assess the color uniformity of the product
 (D) To evaluate the extraction efficiency

Particle size influences the dissolution, absorption, and ultimately the bioavailability of the compounds.

#27. Q27. (Multiple-choice, Fill in the blank) Ayurvedic protocols for clinical studies usually integrate '_____,' a documentation method that captures each subject's dosha constitution and imbalance.

(A) A standardized laboratory test battery
 (B) A detailed patient history form
 (C) Case documentation as per classical format
 (D) A modern diagnostic algorithm

Classical case documentation captures specific information regarding a subject's dosha constitution, integral to Ayurveda.

#28. Q28. One important aspect in 'food-based research' for Ayurveda is:

(A) Analyzing only the flavor profiles of herbal foods
 (B) Investigating the synergy between traditional dietary guidelines (pathya) and measurable health benefits such as glycemic control and gut health
 (C) Focusing solely on calorie content
 (D) Evaluating packaging design for consumer appeal

Ayurvedic food research examines how traditional dietary practices influence measurable health outcomes.

#29. Q29. Which statement is not correct about polarity in extraction?

- (A) Polar solvents (e.g., water, methanol) dissolve polar molecules
- (B) Non-polar solvents (e.g., hexane) dissolve lipids and essential oils
- (C) Mid-polar solvents (e.g., ethyl acetate) extract certain phenolics or glycosides
- (D) A single solvent is always sufficient to extract all classes of phytochemicals

Due to the varying polarities of phytochemicals, no single solvent can extract all compounds efficiently.

#30. Q30. In pre-clinical safety evaluation, an LD50 test:

- (A) Measures the effective therapeutic dose
- (B) Determines the lethal dose at which 50% of test animals die, indicating the acute toxicity range
- (C) Calculates the average recovery time after exposure
- (D) Identifies the dose required for a noticeable pharmacological effect

LD50 quantifies the dose at which 50% of the test subjects succumb, indicating acute toxicity levels.

#31. Q31. Match the following clinical trial phases with their descriptions: Phase I trial; Phase II trial; Phase III trial; Phase IV trial

- (A) 1-a, 2-b, 3-d, 4-c
- (B) 1-b, 2-d, 3-c, 4-a
- (C) 1-d, 2-c, 3-b, 4-a
- (D) 1-b, 2-a, 3-d, 4-c

Phase I trials determine safety (b), Phase II trials refine dosage and assess preliminary efficacy (d), Phase III trials confirm efficacy on a large scale (c), and Phase IV involves post-marketing surveillance (a).

#32. Q32. Why randomization is crucial in Ayurvedic clinical trials.

- (A) There is a lack of reliable historical data
- (B) It minimizes selection bias, ensuring that treatment groups are comparable and results are more credible
- (C) It speeds up the trial process significantly
- (D) It is required by international regulatory bodies only

Randomization ensures that confounding variables are evenly distributed, reducing bias in trial outcomes.

#33. Q33. If an extract is fractionated by column chromatography and each fraction is tested for bioactivity, this approach is known as:

- (A) Simple solvent extraction
- (B) Bioassay-guided fractionation

- (C) Random fractionation without testing
- (D) Direct analysis of the crude extract

Bioassay-guided fractionation involves testing each fraction for bioactivity to identify the active components.

#34. Q34. GC-MS is most suitable for analyzing:

- (A) High molecular weight polymers
- (B) Volatile oils or low-boiling phytochemicals in an Ayurvedic formula
- (C) Non-volatile, thermally labile compounds
- (D) Large biomolecules like proteins

GC-MS is ideal for analyzing volatile or semi-volatile compounds such as essential oils in herbal extracts.

#35. Q35. In designing data management, the researcher ensures that:

- (A) Data is collected without standardization
- (B) Every data entry is tracked from source (lab/clinic) to final analysis for accuracy and reproducibility
- (C) Data is stored in multiple uncoordinated formats
- (D) Results are interpreted without verification

Systematic data management ensures accuracy and reproducibility in research findings.

#36. Q36. A reason to integrate classical *doṣa* endpoints with modern biomarkers in an Ayurvedic clinical study is:

- (A) It is irrelevant to modern research
- (B) It can demonstrate synergy between subjective traditional assessments and objective measures
- (C) It undermines the validity of classical methods
- (D) It increases the complexity without added benefit

Integrating traditional endpoints with modern biomarkers provides a comprehensive evaluation of therapeutic outcomes.

#37. Q37. (Multiple-choice, Fill in the blank) '_____ tests,' such as the FeCl_3 color reaction, can help reveal the presence of phenolic or polyphenolic groups in plant extracts.

- (A) Spectrophotometric
- (B) Chromatographic
- (C) Colorimetric
- (D) Electrochemical

Colorimetric tests produce observable color changes when specific functional groups, like phenols, are present.

#38. Q38. Which statement is not correct about 'reverse pharmacology' in Ayurveda?

- (A) It starts by observing traditional usage outcomes first
- (B) It subsequently uses laboratory research to confirm or elucidate mechanisms
- (C) It never requires any modern data or validation
- (D) It can accelerate the translation of classical experience into modern evidence

Reverse pharmacology integrates modern validation with traditional observations; it does not exclude modern data.

#39. Q39. Pre-clinical toxicity tests typically do not include:

- (A) Acute toxicity studies (e.g., LD50 determination)
- (B) Placebo-controlled evaluations
- (C) Observations of organ pathology and serum biochemistry post-exposure
- (D) Chronic ingestion studies for carcinogenic or mutagenic effects

Pre-clinical toxicity studies typically focus on dose-related toxicity and do not involve placebo-controlled designs.

#40. Q40. Match the following analytical techniques with their functions: HPLC; NMR; IR spectroscopy; GC-MS

- (A) 1-c, 2-d, 3-b, 4-a
- (B) 1-d, 2-c, 3-a, 4-b
- (C) 1-a, 2-b, 3-c, 4-d
- (D) 1-b, 2-a, 3-d, 4-c

HPLC separates components under pressure (d), NMR provides nuclear spin information (c), IR spectroscopy identifies functional groups (a), and GC-MS separates volatile compounds and analyzes fragments (b).

#41. Q41. If an herbal formula aims to reduce 'Ama' (toxic accumulations), a modern trial might measure:

- (A) Gastrointestinal transit time
- (B) Inflammatory or oxidative stress markers (e.g., CRP, MDA)
- (C) Blood pressure changes
- (D) Liver enzyme levels

Measuring inflammatory or oxidative stress markers can serve as a modern endpoint corresponding to the Ayurvedic concept of reducing 'Ama.'

#42. Q42. The advantage of conducting a pilot study in a new Ayurvedic research protocol is

- (A) It identifies potential logistical or design flaws, allowing refinement of the main study before full launch.

-
- (B) It reduces the time of new drug launch
-
- (C) It helps in identifying the target market
-
- (D) It helps in hiding the facts

Pilot studies help detect issues early to improve the quality and efficiency of larger studies.

#43. Q43. In a controlled clinical trial, the use of a 'placebo' in an Ayurvedic context helps to:

-
- (A) Reduce overall study costs
-
- (B) Compare the herbal intervention against an inert substance, confirming observed effects are due to the intervention
-
- (C) Increase the complexity of blinding without added benefit
-
- (D) Allow flexible dosing adjustments during the trial

Placebo controls help to distinguish true therapeutic effects from placebo effects in clinical research.

#44. Q44. For extracting lipophilic fractions from plant material, a typical solvent is:

-
- (A) Water
-
- (B) Hexane or petroleum ether
-
- (C) Ethanol
-
- (D) Acetone

Non-polar solvents such as hexane are optimal for extracting lipophilic compounds.

#45. Q45. Which best reflects 'clinical data management' in an Ayurvedic trial?

-
- (A) Relying on handwritten notes without standardization
-
- (B) Using standardized case report forms (CRFs) and digital databases with validation protocols
-
- (C) Storing data in disparate, uncoordinated formats
-
- (D) Performing manual data entry without cross-checking

Robust clinical data management involves the use of standardized digital tools to ensure data integrity and reproducibility.

#46. Q46. Which statement is incorrect about functional group identification?

-
- (A) IR spectroscopy can reveal characteristic peaks for groups such as -OH and C=O
-
- (B) NMR spectroscopy can determine the environment of hydrogen or carbon nuclei in molecules
-
- (C) Spot tests (e.g., Dragendorff's reagent) can confirm the presence of alkaloids
-
- (D) It is unnecessary to confirm the structure if the plant source is well-known

Even for well-known plants, confirming chemical structures via functional group analysis is necessary due to variability in

composition.

#47. Q47. If an Ayurvedic formula claims to reduce blood sugar, pre-clinical models might use:

- (A) Normoglycemic animal models
- (B) Diabetic animal models (e.g., streptozotocin-induced or diet-induced hyperglycemia)
- (C) In vitro cell culture assays only
- (D) Studies in healthy volunteers

Using diabetic animal models is appropriate to assess a formula's hypoglycemic effects.

#48. Q48. During a Phase II trial for an herbal pill, the main aim is:

- (A) Evaluating the long-term safety profile
- (B) Assessing efficacy in a moderate patient group and refining the dosage range
- (C) Comparing multiple herbal formulations simultaneously
- (D) Monitoring post-marketing trends

Phase II trials focus on evaluating efficacy and determining the optimal dose in a moderate-sized patient group.

#49. Q49. (Multiple-choice, Fill in the blank) A major approach called '_____ fractionation' involves repeated extraction, isolation, and testing of each fraction for its bioactivity.

- (A) Solvent
- (B) Preliminary
- (C) Sequential
- (D) Bioassay-guided

Bioassay-guided fractionation is the process where fractions are repeatedly isolated and tested for bioactivity to identify the active constituent(s).

#50. Q50. A recommended best practice for fundamental Ayurveda research is to:

- (A) Focus solely on traditional texts without modern validation
- (B) Combine classical doṣa- or guṇa-based frameworks with rigorous modern scientific validation methods
- (C) Rely exclusively on empirical modern techniques while ignoring classical principles
- (D) Use only qualitative assessments without quantitative analysis

An integrative approach that combines traditional principles with modern scientific rigor provides more robust evidence.

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