



Innovative Progress: The Essential Role of Pre-Clinical Studies in Animal Models

Halbert Theresa*

Department of veterinary science, University of Sydney, Sydney, New South Wales 2006, Australia

*Corresponding Author: Halbert Theresa, Department of veterinary science, University of Sydney, Sydney, New South Wales 2006, Australia; Email: theresah@gmail.com

Received date: 23 April, 2024, Manuscript No. JEEET-24-144134;

Editor assigned date: 25 April, 2024, Pre QC No. JEEET-24-144134 (PQ);

Reviewed date: 9 May, 2024, QC No. JEEET-24-144134;

Revised date: 16 May, 2024, Manuscript No. JEEET-24-144134 (R);

Published date: 23 May, 2024, DOI: 10.4172/2324-83414.1000098

Description

Pre-clinical studies involving animal models are a foundation of biomedical research, bridging the gap between laboratory discoveries and human clinical trials. These studies are important for assessing the safety, efficacy and underlying mechanisms of new treatments before they are tested in humans. The importance of pre-clinical research cannot be overstated, as it provides essential insights that guide the development of new drugs, therapies and medical devices.

Importance of pre-clinical studies

Pre-clinical studies are designed to evaluate new treatments by using animal models to simulate how these treatments behave in a living organism. The primary goals of these studies are to assess safety, efficacy and biological mechanisms. Safety assessment is one of the main objectives, as it helps identify potential toxicities and adverse effects that might not be apparent from initial laboratory tests. Observing how a drug affects different organ systems in animals allows researchers to predict possible side effects and establish safe dosage ranges. Another difficult aspect of pre-clinical research is evaluating the efficacy of new treatments. Animal models help researchers determine whether a drug or therapy effectively targets a disease or condition and how it compares to existing treatments. For instance, in cancer research, animal models are used to test the effectiveness of new anti-cancer drugs in reducing tumor size or inhibiting cancer growth. In addition to assessing safety and efficacy, pre-clinical studies provide insights into the biological mechanisms underlying a treatment's effects. Understanding how a drug interacts with cellular pathways and molecular targets helps refine treatment approaches and develop more targeted therapies, advancing personalized medicine [1-4].

Methodologies in pre-clinical studies

The methodologies employed in pre-clinical studies are difficult for obtaining reliable data. Selecting appropriate animal models is essential for ensuring that the data is relevant and reproducible. Rodents, such as mice and rats, are commonly used due to their genetic similarities to humans and their well-characterized biology.

Other models, such as non-human primates, are employed for studies that require closer physiological parallels to humans. Genetically modified animals can also be used to study specific genetic conditions or diseases. Designing pre-clinical studies involves determining the correct dosage, administration route and study duration. Researchers implement controls and randomization to minimize bias and validate results, while also considering ethical aspects such as minimizing animal suffering and using the fewest animals necessary. Analyzing data from these studies involves assessing changes in biomarkers, organ function and behavioral responses. Statistical methods are used to determine the significance of findings, which helps guide decisions on whether to proceed to human clinical trials [5-7].

Impact on medical advancements

The impact of pre-clinical studies on medical advancements is significant. Many vaccines, such as those for polio, hepatitis and COVID-19, were developed with important data obtained from animal models. These studies provided information on vaccine safety, efficacy and optimal dosing. In cancer research, animal models have been instrumental in developing targeted therapies like monoclonal antibodies and immunotherapies. Additionally, pre-clinical research has contributed to advancements in treating chronic diseases such as diabetes, cardiovascular conditions and neurological disorders by testing new drugs and understanding disease mechanisms [8-10].

References

1. CSA. Federal Democratic Republic of Ethiopia Central Statistical Agency Agricultural Sample Survey 2020/21 (2013 E.C). Volume II report on livestock and livestock characteristics. Addis Ababa, Ethiopia. 2021.
2. Mekasha A, Tesfaye K, Duncan AJ. (2014) Trends in daily observed temperature and precipitation extremes over three Ethiopian eco-environments. *Int J Climatol* 34(6):1990-1999.
3. Abegaz S, Duguma G, Kumsa T, Soboka B, Bacha D et al. (2004) On-farm verification of sheep finishing technology in Eastern Wollega zone. *ESAP Proceedings*. 12:241.
4. Wall R, Shearer D. (2008) .Veterinary ectoparasites: Biology, pathology and control. John Wiley & Sons; Apr 15.
5. Kumsa B, Laroche M, Almeras L, Mediannikov O, Raoult D et al. (2016) Morphological, molecular and MALDI-TOF mass spectrometry identification of ixodid tick species collected in Oromia, Ethiopia. *Parasitol Res*. 115:4199-210.
6. Guglielmone AA, Robbins RG, Apanaskevich DA, Petney TN, Estrada Peña A et al. (2010) The Argasidae, Ixodidae and Nuttalliellidae (Acari: Ixodida) of the world: A list of valid species names. *Zootaxa* 2528:1-28.
7. Minjauw B and McLeod A. (2003) Tick-borne diseases and poverty: The impact of ticks and tick-borne diseases on the livelihoods of small-scale and marginal livestock owners in India and eastern and southern Africa. 124.
8. Kumsa B, Signorini M, Teshale S, Tessarin C, Duguma R et al. (2014) Molecular detection of piroplasms in ixodid ticks infesting cattle and sheep in western Oromia, Ethiopia. *Tropical animal health and production*. Trop Anim Health Prod 46(1): 27-31.

9. Desalegn T, Fikru A, Kasaye S. (2015) Survey of tick infestation in domestic ruminants of Haramaya District, Eastern Hararge, Ethiopia. *J Bacteriol Parasitol* 6(5):246.
10. Seyoum Z, Proceeding of the Ethiopian Veterinary Association, Ethiopian Veterinary Association. Study of ticks and tick-borne diseases on cattle at Girana valley in the North Wollo Zone. *Proceedings of the Ethiopian Veterinary Association*. 2001; 15.