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Contributors

1. Nand Khushboo Y1

2. Sikha Samuel B2

Department(s) and institution(s)

1. Department of Community Health, Christian Medical College, Affiliated to Sri Chitra Tirunal Institute of Medical Sciences and Technology
2. Department of Physical Medicine and rehabilitation, Christian Medical College, Affiliated to Tamil Nadu MGR University

Corresponding Author:

Name: Dr Khushboo Yamima Nand

Address: Herbertpur Christian Hospital, Herbertpur, Dehradun, Uttarakhand 248142

Phone number: 08940873957

E-mail address: khushboo.nand@gmail.com

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#### The question is not, can they reason, nor, can they talk. But, can they suffer?

***–Jeremy Bentham***

Animals have been used for various purposes like pets, slaughter, abuse, experimentation, testing, and research. Though the animals were first used in research in second century AD, their systematic use in research began about 100 years ago, when vaccines for polio and rabies came up for production. Since then, the animals have been used in research investigations and production and testing of drugs and have played an important role in unfolding vital information about the human and animal life processes.

The Government of India has authorized the National Accreditation Board of Testing and Calibration Laboratories (NABL), promoted by the Department of Science and Technology, to provide accreditation services to laboratories covering a wide range of subjects including biological and clinical laboratories. (1)

**Globally:**

According to the available data of 2010, In US, 1.28 million animals were used in experiments. In 2009, In Canada 3.38 million animals were used. In 2012, In UK, 4.11 million experiments were done on animals and 2.95 million experiments were done without anaesthesia. (1)

Under the U.S. Department of Health and Human Services, the National Institutes of Health (NIH) is the primary federal agency that conducts and supports medical research and is “the largest source of funding for medical research in the world. To achieve the mission of NIH, animals are used in area of research, training and biological testing. The mouse has become the flagship of animal testing, especially useful with genetic modifications, gene knockouts [genes are removed], and knockins [genes are added]. In 2003, NIH [National Institutes of Health] launched the Knockout Mouse Project and has awarded more than $50 million with the goal of creating a library of mouse embryonic stem cells lines, each with a gene knocked out (2) The basic assumption was that if animals used in laboratories experimentally contracted an infection and were cured, there was a high probability of stopping the same disease in humans. Examples of experiments, forcing dogs to inhale cigarette smoke did not show a link to lung cancer; Flosint, an arthritis medication, tested safe in monkeys but caused deaths in humans. Due to species differences between human and animals, there has been incorrect conclusions drawn and has led to flawed science. (3) But still the practice of animal experimentation continues.

**Animal model:**

The use of animal models allows researchers to investigate disease states in ways which would be inaccessible in a human patient, performing procedures on the non-human animal that imply a level of harm that would not be considered ethical to inflict on a human.

In order to create these models, animals are subjected to invasive procedures, which can include surgeries, traumatic injuries, burns, force-feeding, blood draws, biopsies, food, water, and social deprivation, dart gun sedation, prolonged restraint, behavioral and environmental manipulations, viral and bacterial infections, and exposure to toxic drugs and chemicals. Examples include, “creating heart attacks, heart failure, abnormal heart rhythms, strokes, and other cardiovascular traumas in monkeys, dogs, pigs, and other animals; inducing symptoms of migraines in cats and primates through brain stimulation and manipulation with chemicals; implanting electrodes into the intestines of dogs to induce motion sickness and vomiting; implanting electrodes into the brains and eyes of monkeys and cats to conduct neurological and vision experiments; and dropping weights onto rodents to produce spinal cord injuries and paralysis.”(4)

**Vivisection:**

Vivisection is the practice of experimenting on live animals. Every year various research facilities across India like AIIMS, National Institute Of Nutrition (NIN), Animal Research Center, invest lot of resources and money for conducting experiments on rats, mice, cats, monkeys, rabbit. (5)

**Laws and acts:**

Under the provision of Prevention of Cruelty to Animals Act 1960, Committee for the Purpose of Control and Supervision of Experimentation on Animals (CPCSEA) was created. In India, one of the largest animal suppliers, the National Centre for Laboratory Animal Sciences (NCLAS) in Hyderabad, supplies approximately 50,000 animals to laboratories every year and to 175 institutions in India, including pharmaceutical companies and educational institutions. Some laws and regulations in US: Animal Welfare Act, IACUC (Institutional animal care and use committee). (6) The three Rs i.e.: Reduction, Refinement, Replacement are a set of principles that scientists are encouraged to follow in order to reduce the impact of research on animals**. Reduction** includes reducing the number of animals used in experiments by improving experimental techniques, improving techniques of data analysis, sharing information with other researchers. Refinement means refining the experiment or the way the animals are cared for so as to reduce their suffering by using less invasive techniques, better medical care, better living conditions. Replacement means replacing experiments on animals with alternative techniques such as using computer models, studying human volunteers, using epidemiological studies. (7)

**Animals and their uses:**

Dogs are mostly used in cardiovascular studies, heart and lung research, genetic studies, age-related research, pulmonary studies, cancer research, and orthopedics. In orthopedics they are used for development of prosthetic devices for hip and knee replacements, vertebral fusion models, cervical disc degeneration. Cats are commonly being used in NIH-funded studies of neurological, cardiovascular, and respiratory diseases, and the immune system.”Researchers also use cats in cancer research, genetic disorders, eye, ear, and infectious disease research. Nonhuman primates are used in research on vaccines, infectious, cardiovascular, and neurological diseases, aging, reproductive biology, gene therapy, drug addiction, xenotransplantation (cross-species transplants), and vaccine and toxicity testing. The most commonly used primate species are Rhesus and Cynomolgus macaques, also known as crab eating macaques. Of the nonhuman great apes, chimpanzees are currently the only species used in biomedical research. (5)

 In 2009, over 222,000 rabbits were used in research, more than any other species covered under the Animal Welfare Act (AWA), followed by guinea pigs and hamsters, both used a great deal in toxicity testing and as models for infectious, cardiovascular, and neurological diseases, and drug abuse research. Both mice and rats are heavily used in vaccine and drug research and testing, and birds are used in research on organ development and deformity, visual impairment, muscular dystrophy, and nutrition, among other things. (8) Areas of disease research involving animals include neurological, infectious, digestive, genetic, connective tissue, and chronic diseases. In these areas, animals are used as models of traumatic brain injuries, spinal cord injuries, congenital blindness, Parkinson’s, Alzheimer’s, AIDS, diabetes, cancer, obesity, and so on. (8)

**Drug and Vaccine development:**

Potential drugs are required to be tested in at least two animal species in preclinical trials before moving on to human clinical trials. (3) For eg. A complete batch test for a therapeutic protein can involve 12,000 mice and can cost $2.4 million.

**Animal use in testing:**

1. Drug testing:

It is done to predict toxicity, corrosivity, and other safety variables and effectiveness of new products. Dr. Gerhard Zbinden, world’s leading toxicologist once stated this process to be “a ritual mass execution of animals.” (3)

1. LD50 test:

The traditional LD50 (lethal dose 50 percent) test is done usually on rats and mice in which they are forced to ingest chemicals to determine the dose that results in the death of 50% of animals. In 1985, the Pharmaceutical Manufacturers’ Association opposed the traditional LD50 test and an alternative Limit test was suggested which uses only 6-10. (3)

#### Eye irritancy—Draize test:

The Draize test measures the eye irritancy of chemicals and other products by dropping concentrated amounts of a test substance into an animal’s eye mostly albino rats since they are inexpensive and then assessing the eye’s reactions using a subjective numeral score to indicate the level of eye damage and injury. (3)

#### Skin irritation, corrosion, sensitization, and absorption tests:

The test is done by placing a chemical or chemical mixture on an area where the animal’s skin has been shaved. The skin may be prepared by removing layers of skin to cause abrasions. These tests cause severe pain to the animal and can result in ulcers, bleeding, bloody scabs, and discoloration of the skin. Skin sensitization tests are used to determine if a substance causes an allergic reaction and were typically performed on guinea pigs. (3)

#### Mutagenicity and carcinogenicity:

Mutagenicity and carcinogenicity tests examine potential genetic effects from pharmaceuticals, industrial chemicals, and consumer products, classifying the chemicals for cell mutations and carcinogens. For eg, rats and mice are commonly used and killed after examination. (3)

#### Embryo toxicity:

Embryo toxicity involves the toxic effects of a substance on the development of an embryo. In these studies, pregnant animals (rats, mice, rabbits, and sometimes amphibians) are killed just prior to delivery and the fetuses are examined for any sign of toxic effects by the test substance. (3)

#### Genetic Disorders

Animals will have a certain gene changed, added or removed to artificially create a specific disorder. This allows researchers to manipulate other variables or develop potential drugs to treat the condition. In an attempt to overcome the limitations of animal models, researchers are genetically engineering animals, by removing or adding genes they believe relate to specific human diseases. The underlying assumption here is that these new genetically constructed animals will be more human-like. This technology is commonly used in mice and rats and the number of genetically altered (transgenic) animals being produced for research. (3)

**Ethical issues:**

A significant number of animals are harmed or die due to experimenting and testing. Animal experiments are widely used to develop new medicines and to test the safety of other products. Many of these experiments cause pain to animals involved or reduce their quality of life in other ways. It is morally wrong to cause animals to suffer. According to some people, animal testing is wrong because it involves the inability of animals to consent to tests. Humans can make an informed decision to consent while animals have tests forced upon them, with no choice. A major ethical issue with animal testing is that it involves pain, suffering and discomfort under some circumstances. Wherever possible anesthetic is used but for some types of testing, using a pain reliever can mean an interaction with the drug being tested. For this reason, animals must experience the effects of the one drug and if it involves pain. The experiments and research carried out on animals are very expensive. It also involves keeping animals in captivity. Some of the experiments done previously have never been used on humans. Animals and humans are not exactly same is another drawback of doing studies on animals.

**Religious views:**

According to the old Christian belief, Christians believe that God had created animals for the use of human beings and human beings were therefore entitled to use them in any way they want. And animals were distinctively inferior to human beings and were worth little because, humans have souls and animals don't.

Some Christians believe that Bible shows that God made his covenant with animals as well as human beings. In God's ideal world human beings live in harmony with animals.

**Possible solution:**

New technologies, alternatives, and clinical and epidemiological studies in humans can provide us better, more relevant answers without causing animal suffering .Animals could be used for experimentation if their suffering is minimized and human benefits are gained which cannot be gained by any other means.

**Conclusion:**

There is no doubt that non-animal alternatives are the future and that this can happen sooner rather than later. NIH and individual researchers should change their old school mentality of using animal models with all the limitations and sufferings and pain caused to the animals.  According to Dr. Richard Klausner, former Director of the National Cancer Institute, “We have cured cancer in mice for decades—and it simply didn’t work in humans.” (9) Even with genetic engineering, animals are still proving to be poor models for humans.

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