Vetinformatics: A New Paradigm for Quality Veterinary Services

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Abstract
Infectious disease management in animals is a tedious task in the developing world. Computational advancements in medical sciences play a crucial role in the drug development and research. Clinical trials may have the limitations due to the ethical issues, hence a new arena has been used to explore for minimization of animal modelling. "Vetinformatics" is the new approach which deals with databases, proteomics, genomics, drug designing, phylogenetics etc. in veterinary sciences. In-silico drug discovery in veterinary sciences is yet to develop up to the mark in developing countries like India. Application of vetinformatics needs to be focused in future to strengthen veterinary service, research and its development.

Keywords: Vetinformatics, in-silico drug discovery, bioinformatics

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INTRODUCTION

The growth of biotechnological industry in last decade is unique. Not only limited to sequences to gene identification but it reaches to database generation and depositories. Combination of molecular biology, chemistry, biotechnology plays its role but involving information technology increases rapid computation and development. Human genome projects like vast research project is established; even healthcare is also benefitted with computational biology. Lots of nucleic acid and amino acid sequence concerned with etiological agents related to animal diseases have been submitted in GenBank. But using such vast biological information related to veterinary science are not been converted in terms of product using *in-silico* tools.

Especially molecular interaction studies in veterinary sciences using bioinformatics tools for drug design are still untouched. Immediate concern is needed for veterinarians in academia and industry, and the government also often plays crucial role in biomedical research with applications to animal or human health, laboratory, animal medicine and public health. But still, the recent development in this area is yet to be defined up to the mark. Bioinformatics is the one of the highly configured way to collect, compile and represent biotechnology and life sciences information analyses and process information to understand process of life in healthy and diseased states.

CASE STUDY OF VETINFORMATICS

Various developing countries have focused in the area of human drug development and few of them are involved in veterinary drug development research. Yet, there are a few veterinary scientists involved in modern drug development industry. It is very important to understand need of qualified persons to develop new drugs using computational tools in short time. Activities of veterinary scientists may positively influence human health either directly through biomedical research and public health work or indirectly by addressing domestic animal, wildlife, or environmental health. Even though there is shortage in funding and infrastructure, the bioinformatics can be used at minimal cost for conducting

research. It is the basic need and mandatory responsibility of the veterinarians in research field to protect human health and well-being by ensuring food security and safety by their technical inputs in computational research. Zoonotic diseases like rabies, brucellosis, tuberculosis, leptospirosis, anthrax etc., are spread through pets and productive animals that can directly affect human health.

Preventing the diseases, finding the root cause of their disease, and their management is the tremendous task for every veterinarian while dealing with animals. After all, it is the matter of ecosystem which affects the globe [1]. The diseases of economic importance in terms of production loss and animal mortality such as peste des petits ruminants (PPR), entero toxaemia (ET), blue tongue etc., is small ruminants and black quarter (BQ),

haemorrhagic septicaemia (HS) and foot and mouth diseases (FMD), mastitis etc., while cattle and buffalo are the thirst area where alternative mode of controlling the diseases is using new vaccination strategy and development of medicine from locally available and practiced herbal plants [2, 3].

Further, the poultry industry, an important economic zone in animal industry has lots of threats in disease outbreaks. From the regular out breaks, new castle disease (NCD), infectious bursal disease (IBD) and chronic respiratory disease (CRD) to recent challenges on avian influenza, caused by viruses and etiological agents of bacteria are to be highly focused for the emerging trends to solve the problems through computational means.

Table 1: List of Databases and Tools.

Research Area	Tool/Application	Web Address
Nucleotide databases	GenBank	http://www.ncbi.nlm.nih.gov
	DNA Database of Japan	http://www.www.ddbj.nig.ac.jp
	EMBL	http://www.embl.org
Protein Sequence Database	SwissProt	http://www.expasy.org
Sequence Alignment	BLAST	http://www.ncbi.nlm.nih.gov
	CS-BLAST	ftp://tollkit.lmb.uni-muenchen.de/csblast/
	HMMER	http://hmmer.janelia.org/
	FASTA	www.ebi.ac.uk/fasta33
	T-COFFEE	www.ebi.ac.uk/Tools/msa/tcoffee/
Multiple Sequence Alignment	MSAProbs	http://msaprobs.sourceforge.net
	DNA Alignment	http://www.fluxus-engineering.com/align.htm
	MultAlin	http://multalin.toulouse.inra.fr/multalin/multalin.html
	DiAlign	http://bibiserv.techfak.uni-bielefed.de/dialign/
Gene Finding	GenScan	Genes.mit.edu/GENSCAN.html
	GenomeScan	http://genes.mit.edu/genomescan.html
	GeneMark	http://exon.biology.gatech.edu/
Protein Domain Analysis	Pfam	http://pfam.sanger.ac.uk/
	BLOCKS	http://blocks.fhcrc.org
	ProDom	http://prodom.prabi.fr/prodom/current/html/home.php
Pattern Identification	Gibbs Sampler	http://bayesweb.wadsworth.org/gibbs/gibbs.html
	AlignACE	http://atlas.med.harvard.edu
	MEME	http://meme.sdse.edu
	SLAM	http://bio.math.berkley.edu/slam/
	Multiz	http://www.bx.psu.edu/miller_lab
Motif finding	MEME/MAST	http://meme.sdse.edu
	eMOTIF	http://motif.stanford.edu

Inputs on new or alternative drug targets identification and to alter pathways to reset the functional alterations are immensely helpful to the scientist in drug industry. Viral and bacterial ailments are great challenges to current scientist in veterinary drug development. Hence, advance technology is needed to develop strategy to not only design but also target the drug delivery system [4].

Indiscriminate use of antibiotics is also a serious issue, now a day's frequent use of antibiotics leads to development of antibiotic resistance. Major issue is not only to develop resistance but it transfers from one to next generation through genes. Hence, a new trend to develop through computational system in diagnosis and targeted delivery to avoid a threat to reality [5, 6]. There are different databases available in this field which give genomic, proteomic information about diseases e.g. NCBI (National Centre for Biotechnological Information), DDBJ (DNA Data Bank of Japan), EMBL (European Molecular Biology Laboratory) etc. which allow us to define the deposited proteins, DNA, RNA, molecules drugs, sequences of genes etc. (Table 1) [7, 8].

"Vetinformatics" will open the doors for animal health informatics system, in which development of animal gene databases, phylogenetic information, proteins, genetic traits, diseases, area wise distribution and epidemiology data mining can be done. All animal related information can be gathered under one roof. This tools play important role in drug development; using advanced methods like lead development against target proteins, pharmacophore development, high throughput virtual screening of large small molecule databases, *in-silico* analysis of targets, docking studies, sequence editing using high quality software's like Accelrys Discovery Studio, TriposSurflex, Genious Schrodinger Suite, FlexX, Hex, PyRx etc.

Major Aim Includes
- To organize only veterinary data which allows researchers to access it.
- To inform veterinarian about development and management.
- To help scientist for gathering information about proteins and structures in a meaningful manner to ease drug development.

In this era, electronic information system has its own importance, then why not to be used in this field. As day by day diagnosis is becoming an intricate job, we need to get accurate solution. Instead of trial and error time consuming process; this computational integration is always fastest and reliable. Doctors, veterinarian society should/must connect to this well-developed science. It is urgently needed to get trained as a veterinary scientist in vetinformatics; not to serve only for humans but also for living organism to maintain the principles of life [9].

CONCLUSION
Veterinary information is the fundamental commodity of veterinary medicine. Veterinary informatics is the study of how to best use this commodity. It is time to consider incorporating courses on veterinary informatics into the veterinary curriculum, providing sessions on veterinary informatics in professional development programs, and developing graduate programs in veterinary informatics to educate veterinarians and train specialists in this important emerging field. The longterm solution to effective communication of veterinary knowledge is education in veterinary informatics. By placing more emphasis on learning and using the techniques of veterinary informatics, we can improve the effectiveness, the efficiency, and the quality of veterinary medicine.

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