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Biobanking: A Magic Tool in Progressing World, Potential Applications and Ethical Concerns

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Abstract: Biobanking is a highly developed system that has programmed storage of living materials and related information. Biobanks play a developing role in modern research projects. These units fulfill all the requirements which are associated with the research, especially in the medicinal field. Biobanking is a basic source in separating the relationship between genetic history and ecological elements of the natural course. Traditional oncological study is highly dependent on several biological samples having good standard data. In the past two decades, most biobanks have been established to facilitate research advancements in medicines like embryonic or stem cell banks and sample quality is also very significant. In this paper, we reviewed the medical importance of biobanking and some moral and legal concerns that are associated with biobanks. The aim of this article is to produce awareness in the public towards biobanking.

Keywords: Biobank, biomaterials, applications, biospecimens

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1. Introduction

1.1. Biobanking

The biobanking is the procedure of securing bio-specimens of essential and basic capacity, valuable quality and labeling that are representatives of the diseased inhabitants of that certain area (Gao et al., 2022). Biobanking is also the process of storing human components like blood, plasma, tissue, fluids and other derivatives for research purpose referred as biobanking as well. Biobanks vary in their design, arrangement, user, and different state to state, and also vary for primary clinical health purpose and basic research support (Korn et al., 2000; Malsagova et al., 2020; Troiani et al., 2021).

Collection, assemblage, transforming, saving and propagation of samples, which are biological in nature, are steps of biobanking. It likewise incorporates the connection of natural information with clinical information and data which are masterminded in a methodical plan (Vaught et al., 2009). The resources which are biomaterial in nature like serum, blood, tissue and cells have a critical importance in the field of academic research. Recently biomaterial resources used in the medical field research are produced by a single research group or a single investigator (Artene et al., 2013). Before the 1990, scientist collect the biological samples for their research but cannot share their data among other laboratories. After 1990, scientists understand that many diseases are genetic diseases few of them are caused by single gene defected in most multiple genes are involved. By advances in technology scientists start to collect information and also start genome wide scanning. By this way institute of biobank established to store the genotypic data and phenotypic data (McInnes et al., 2019). During 2008 United States stored around 270 million tissue specimens in biobank. Moreover, 20 million samples,

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annually, were added (Haga and Beskow, 2008; Knoppers et al., 2012).

The bio specimens are obtained from the patients by diagnostic tests and therapeutic procedures. The specimens accumulated by biobanks are transformed and conserved by different ways. These are utilized in various clinical and research areas, for example, obsession freezing and live cells banking. In the biobanks the bio-samples are annotated and processed then released to researchers. For the processing and annotation bio-specimen chots are selected from the biobank data base through specific site (Watson et al., 2009). There are several configurations of biobanks research from population biobank to disease focused biobanks. There are some informal biobanks which have small and great research studies. Fundamental research infection related banks and clinical preliminaries biobanks (Olson et al., 2013).

Firstly in 1996, Loft and Paulsen used the term biobanking in the paper having tittle job of oxidative DNA harm as an autonomous hazard factor in malignant growth which was utilized for human natural materials (Coppola et al., 2019). The organization used for collecting and saving biomaterial resources of human are increasing in number day by day significantly it has been increased during past decade (Mackenzie, 2014). The dynamic development of biobank has been seen during few past decades it was due to understandings of its applications in many fields like in the field of public health, genetic field, also, natural impairments of numerous infections. It helps being developed of new medications and symptomatic techniques for diseases. It also improves the medical care mostly personalized medicines (Pottier et al., 2019). Biobanks store many human tissues samples which are maintained by single researcher or shared between other researchers. By the number and types of tissues stored and extent of clinical data biobanks vary from each other (Knoppers et al., 2005).

The biobank market in the field of human medicines is described as tissues of human body liquids, deoxyribonucleic acids and stem cells for clinical and research uses. It is anticipated in 2017 that the natural use of biobank is utilized to deliver 24.4 billion dollars. It was 12.2 billion dollars in 2012 (Mackenzie, 2014). The growing and increasing of biobank as professionalized take place in past 20 to 30 years (Kirwan et al., 2019). The biobanks which are general have more flexibility as they can bolster in the decent variety of studies like cross sectional investigations of genotype and phenotype relationship, case or control study in which biobanks used for case or control, cohort studies in this case biobanks used to connection inherited variations with strength care (Kinkorová, 2016). The biobank which are population wide have been developed in many countries like Sweden, Denmark, Latvia, South Korea, Estonia, Canada, Japan, Singapore USA, Iceland and UK (De Souza and Greenspan, 2013). Number of international countries have developed the guideline and legislation governing the biobanks. In 1999, US commission of National Bioethics advisory delivered a report on moral and appropriate use of biological materials. In 2005, US National cancer institute was established for bio specimen's research. In 2006, Council Minister of Europe recommended biological material on human resources (Haga and Beskow, 2008). The purpose of this review is to identify, classify and examine the data which is used in the recent research and develop social behavior toward bio banking of human samples and data. This paper moves around the various ways to develop awareness of people toward the biobank (Domaradzki and Pawlikowski, 2019). Several ethical legal and social issues have been discussed that raised toward biobanking (Cambon, 2004). Throughout the article we will highlight the important application of biobanking.

1.2. Biological Resource Centers

Biological resource centers, have various responsibilities, usually focus on distinct sets of organisms. Such establishments are designed of several kinds of activities and "routine" analysis laboratories. The public service and private, government and commercial events which provide significant cultures as "seed" stocks as ordinary sources of cultures described in literature, for the progress of industrial advances, for regulator of testing quality assurance of goods, like parental strains in biological assay and published scientific data, like reference materials for the biomedical assay, reference strain for taxonomical investigations and like center for the preservation of biodiversity (Muller et al., 2005).

1.3. Principles for Biological Resource Centers

Almost four essential features of collecting biological specimens which should be constant to form the worth of stored material like purity (without contaminated organisms), authenticity (accurate identification of each strain) stability (comprising stable functional characteristics) and qualification data linked to each conserved store of cultures. Purity

of strains is serious to evade flawed data of culture. In various situations formation of a pure culture is impossible as entity may have saprophytic association with other organism and may not live as pure culture, or only can be well-preserved within its host cells, for instance symbiotic fungi inside orchid seeds (Wood et al., 2006).

2. Applications of Biobanking

2.1. Role of Biobanks in Health Care

In epidemiological and public health research scientists focused on the environmental determinants of health and diseases. They also take the genomic variant as center of their attention. The advancements in genomics have changed these approaches (Brand and Probst-Hensch, 2007). Biobanks support the health care effectively by intention and validation of markers of some diseases and therapeutic applications. The imaging biobanks are recent trends of biobanking which are used to improve health care.

The attention of people toward the biobank has increased at international level due to the development of personalized medicines especially for the treatment of cancer. Biomarkers which are related to disease their recognition and confirmation is also necessary (Webster et al., 2011). for the prognostic diagnose and many others therapeutic applications which help to improve the health of a society and also provide the protection of people from the disease (Sarojini et al., 2012). The many drugs have been developed with the help of biobank which used for the effective treatment of diseases, so it plays a significant role with regarding to the health of health of community. The discovery of these personalized medicines relies on the scheme of precise diagnostic tests which recognize the patient accurately for targeted therapies. For example in the patient of breast cancer HER2 is overexpressed. It gives an important information about the patient in which trastuzumab drug is used (Hamburg and Collins, 2010). The purpose of biobank is to promote health and wellbeing of community (Forsberg et al., 2009). The importance of bio banking as clinically to protect against recent diseases by the application of personalized medicines. A main purpose of personalized medicines is to develop the targeted therapies and to reduce the side effects (Murtagh et al., 2011).

2.2. Biobanking for Etiology

The diversity of studies on etiology, microbial pathogenesis and epidemiology depends on obtaining biological samples. Biobank has collection of samples which are used for biological biomedical, industrial research and laboratory diagnosis (Paoli, 2005). Biobanking has large diversity of designs that associated with particular goals, such as disease oriented biobank for the epidemiology, a healthy exposed cohort, case control design, Study of germ line DNA and Huge collection of data especially designed (Riegman et al., 2008).

The consideration of causes of common life warnings threats and weakened the diseases is demanding the large number of tests. All these circumstances are due to a large variety of exposures. That diversity has moderate affects and interacts with each other as a complex manner (Allen et al., 2012). For explore into a large variety of exposure a bundle of information is required to be assembled through questions and physical measures and also by saving many biological samples that gives a variety of assay that should be practiced. There are large number of advantages in prospective cohorts to archive the combined effect of genes, environments life style and some other exposures on the diversity of health results (Grimes and Schulz, 2002; Manolio et al., 2006). Understanding of genetics played important rule in the identification of phenotypic of many diseases and their associations with other factors. It played important rule for better understanding of human biology it helped us for the development of drugs especially for the development of personalized treatments (Bycroft et al., 2018).

2.3. Biobanking for Transplantation

During the past years there are multiple developments have been shown in the solid organ transplantation in which different techniques are used some are these, the application of highly developed immunosuppression technique , novel surgical techniques and application of ex sit- machine . These helps for organ transplantation (Moers et al., 2009). The collection bio samples is an old process. From many years different researchers and clinicians are involving in this process for the concern of their subject of research (Hirtzlin et al., 2003; Sándor et al., 2012). From the past thirty years especially from the implementation of legislation like human tissue act 2006 in England. It is more complex but it has limited procedures having a large number of collection including national biobank such as UK biobank, disease relevant and population biobank such as for prostate cancer (Sudlow et al., 2015). An revealing sector of science appearing into sample quality specimen handling and foundations of biobanking has been revealed as consequences (Vaught, 2006).

Besides these there are some moral and regulatory issues have been revealed particularly these are related to some genetic information's getting samples and sample storage (Knoppers, 2005).

There are many biobanks for organ donation and several local centers of transplantation used for collection of samples which are already presents. These helped to develop the research which are related to the area of person. The purpose of mine is to formation of biobank which would develop some new borders of research by looking into donors particularly with the purpose of developing the standard of denoted organ (Hanif et al., 2018). Solid organ transplantation is used for any organ failure disease at its last stage. Post-transplantation and patient survival have been improved by advancements in immunosuppressant medications treatments of infections and by the application of many surgical techniques. Organ failure is a major cause of death of the patients in all types of transplantation (Eisenga et al., 2018).

The purpose of biobanking for organ donation are following

1). Wishes to help the others

2). Family should be informed about organ donation

3). A desire to contribute medical progress.

In transplant study many of the people have desire to donate organ but less than 50% of their family consents at the time of removal of organ. The Survey about the donations repots us consents rates are varying from 18 to 92.8% depending on the methodology used (Longaray et al., 2017)

2.4. Biobanking for Lipidomic and Metabolomics

Lipidomic leads with different pathways and many networks of cellular lipids in biological systems (Wenk, 2005). Lipidomic includes research identifications, quantifications of thousands of cellular lipid molecules and their association with other biological molecules like carbohydrates, lipids and proteins (Han and Gross, 2003). The expeditious advances in technologies promote this field of research. It also involve the treatment of many diseases that relate with metabolites such as diabetes (Han and Gross, 2003). Metabolomics leads with the scientific study of chemical process in which metabolites are involved such as small molecules intermediates, substrates and products of metabolisms (Daviss, 2005). Metabolome is defined as complete set of metabolites in biological cells tissues and other cell related bodies (Jordan et al., 2009).

Lipidomic and metabolomics are most important to form accurate medicines. By the survey of metabolite and lipids the particular expression of metabolite take place like metabotype of an organism. It gives us information that have tendency to improve many diseases and their drugs (Kirwan et al., 2019). There are many biobanks which are developed have biological motive with the analysis of genetics or technical research based survey. Moreover, the assemblage of requirements for the extraction of DNA and their survey are basically different from the metabolomics because the extraction of DNA is more vigorous (Kirwan et al., 2018). In metabolomics the recognition of chemical process take place take place in which the metabolites are involved. The purpose of metabolomics is calculation of all biological samples and all potential metabolites and their statistical analysis is also taken. There is a minute difference in lipidomic and metabolomics.

In lipidomics have low molecular weight like the profiling of lipid molecule from the biological samples (Kirwan et al., 2018). The implementation of metabolomics technology in in the diversity of epidemiology is become a routine work. The number of topics in this etiological study is taken as rule large, generally a large number of samples has been measured to insure the development statistical important interactions. The data in metabolomics can be categorized as quantitative or semi-quantitative. In the quantitative the complete concentrations is evolved but in semi-quantitative not all concentration is discussed (Dane et al., 2014).

2.5. Biobanking and Cancer Biology

Cancer is the most vital health issue. According to the survey in 2017 at United States almost 600920 deaths occur due to cancer. Traditional treatments such as radiotherapy and cancer therapy are less effective treatments due to their less specificity (Raza et al., 2019). During the last 10 years a tremendously development has been shown in the field of oncology, now cancer is considered as main cause of death in the whole world (Bener et al., 2008). Personalized medicines have been developed through biobanks. These medicines helped to proceed toward the patient of cancer extraordinarily (Kinkorová, 2016). In biobank there is a schematic program in which information are collected and operated by using bioinformatics, cytomics, genomics, transcriptomics for survey and assuming of cancer and its treatments

by using advanced metabolites (Capocasa et al., 2016).

There are several bio specimens in world from where the biological samples are separated and collected on the range of their speed, number, variety and steps of different types of cancer from the large number of patients. The data about the patients based on their particular symptoms, etiological data and data about some environmental factors are saved. Some properties of histological cancer are reported (Capocasa et al., 2016).

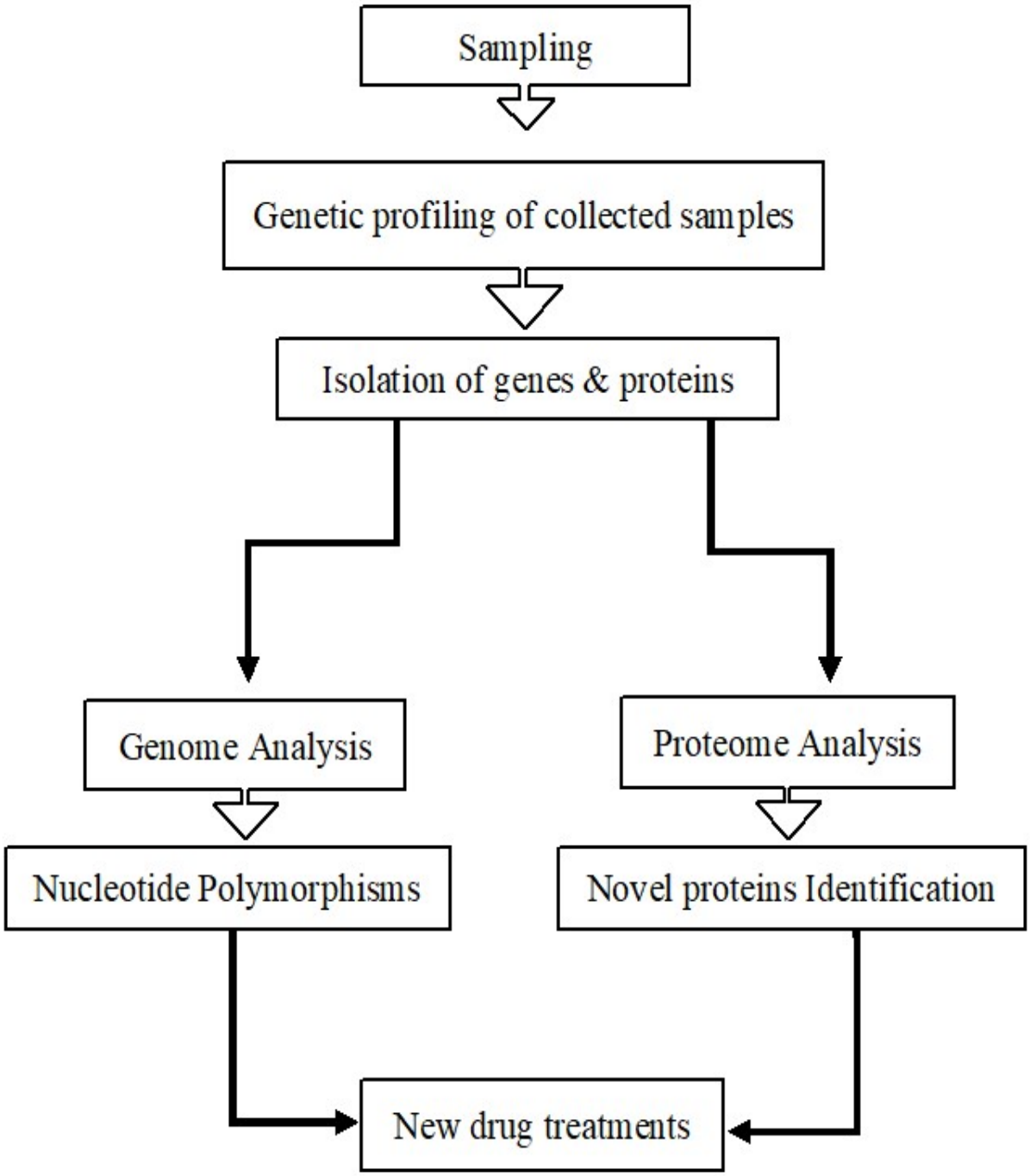

Fig. 1 General data processing and functioning of biobanking

A biobank of cancer helped the information about bio specimen having good quality of governance, organizations, cellular pathology and molecular data analysis. All running process are systemized between many biobanks in which they follow the international protocols like National cancer institute guideline in the US, confederation of cancer biobanks guideline in UK and international society for biological specimen instructions in Europe (Paskal et al., 2018; Tan et al., 2022; Vaught et al., 2009). There are multiplex systems in cancer biobanks in which standardized collection cancer tissues and their related data is saved. Personalized medicines used for avoidance divination and the treatment of cancer (Patil et al., 2018).

Drug developments and discovery of many biomarkers take place by the application of cancer cell lines, but these are outstanding for the concluded clinical response (Luna et al., 2020; Risha et al., 2020; Wilding and Bodmer, 2014). These clinical predictive values of cancer cell lines come from the recognition of their shortcomings and less ability to summarize inter and intra tumor heterogeneity. The cancer biology led for the development of targeted therapies (Akbar et al., 2020; Katti et al., 2022; Mani et al., 2022; Mittal and Roberts, 2020; Zhang et al., 2020). In cancer research the biological specimens of human has been used for many years for the translations, to examine pathogenesis of many diseases for testing of scientific hypothesis and approaches to biomarkers in the experimental studies (Riegman et al., 2006). There is a systematic process of data collection, processing and functioning of a biobank Fig. 1.

Most cancer tissue banks and biorepositories collect blood, swabs from lesion sites, biopsy tissues, body fluids. These are maintained in living tissue banks or intra vital biobanks (Luo et al., 2014; Grizzle et al., 2011). There is another type of cancer that is endometrial cancer. It is most common cancer in woman. According to survey 2013 in UK almost 9000 cases of this type of cancer are diagnosed (Adishesh and Hapangama, 2019). The purpose of translational research is to speed up the transition of scientific inventions from the lab to the patients. Biological specimens having high quality is most important resource for translational research associated with specific prevalence. By this way biobanks form a classical platform where all proper biospecimens are stored and used in the research (Hewitt and Hainaut, 2011).

2.6. Biobanking and Infectious Diseases

Biobanking play an important role for estimating the etiology of many factorial infections that are happened due to mutation in the genes and influence of any environmental factor (Branković et al., 2014). In the pathogenesis of infectious disease genetic factor play a vital role to provide us information about that type of diseases by incorporation of genetic material of host that moderate the immune response work as factor of pathogenesis. By this way it can be estimated that host response can calculate the results of any disease or infection (Chan et al., 2009). The study of genome gives us some molecular biomarker and mechanisms as target for identification of infectious disease (Hill, 2006).

The relationship of genetic factors with outcomes of many infectious diseases is examined by the study of genes and genomes wide association. So that biobanks work as infrastructure for the research purposes in genomics of host (Meijer et al., 2012). Biobanks have samples as well as data. This dual nature is the basic of many legal and moral controversy around the biobanks (Townend, 2012). So the biobanks generate knowledge about the etiology of many diseases and improve the diagnosis and treatments of many infectious diseases (Knoppers et al., 2012). Biobanks serve as foundations for the research in the genomics of host and other omics sciences and also evolving the function and interaction of host immunogenic factor in infection (Ballana et al., 2012).

2.6.1. Human Versus Microbial Samples Biobanks

Here, an important description is shown, among the samples which are obtained from the humans suffering from a disease concerned to infection and samples from the infectious agents itself. The former provides the material basis for genes and genome wide association's research. They are relevant to host omic research (Elwell et al., 2013). These samples of infectious disease are paired with relevant phenotypic data of the patients (Paoli, 2005).

2.6.2. IDB Biobank

Infectious disease biobank at Kings College London is a famous example of infectious disease-oriented biobanks. This biobank collects the samples from the patients of different infectious diseases such as HIV, Hepatitis A and hepatitis c and invasive *Staphylococcus aureus*. It also collects data from the healthy subjects. IDB indicate by September 2009

HIV samples donations has been reached upto 500 cases (Towie, 2007; Kozlakidis et al., 2012).

2.7. Social Behavior towards the Biobanking

The constant participation of a large number of people required for the functioning of any biobank and trust of the society toward the research institute is also essential. Due to this, understanding of the attitude of people toward the biobank and factors that affect the respondents and people desire to donate is most important. Therefore, every biobank exist individually social geographical and historical contexts (Hoeyer, 2010). The donation of an organ is a complex process that depends upon awareness of the people about the biobanks (Gottweis et al., 2011; Simon et al., 2011) and trust toward the government and research institute (Lemke et al., 2010) and also having information about expected benefits of biobanking (Meulenkamp et al., 2010) and beliefs of the donors which are religious or cultural on various types of tissues (Joseph et al., 2008; Lewis et al., 2013). When knowledge about social attitude towards biobanking will be increased it will cause the improvement in the effectiveness of this process (Shabani et al., 2014). This is crucial because attention generated around the biobanks cause upraising in exaggerated expectations of possible risks q1).

2.8. World Public Awareness toward the Biobanking

The biobanks founds in many countries. In 2010 a study on biotechnology has shown that two thirds of the Europeans have no idea about the biobanks. A high level of awareness has been observed in Scandinavian countries including 80% Iceland, Sweden 75% and Norway 65% (Gaskell et al. 2013). Study on biobanks demonstrate that a large number of Finns almost 83% have minute knowledge about the biobanks and 43% of the people have never heard about the term of biobanking (Tupasela et al., 2010). Same in Italy many of the people do not know the difference between the biobank of research and the biobank of forensic and nor they know about any biobank (Tozzo et al., 2017). The 72% of the brilliants students from the faculty of health sciences have idea about DNA biobanks (Krajewska et al., 2011). As the same majority of the Americans have never heard about the term of biobanking (Lipworth et al., 2009).

2.9. Biobanks for Agricultural Crops

According to recent survey about 75,000 of species of plants are at the risk of extinction which is a big alarming condition to save the species (Pimm and Raven 2017). The safe way of protection of a species is the storage of its seeds as the seeds have a complete germplasm for growing into a complete seedling. There are several species which can tolerate desiccation and pollens desiccation tolerate (Franchi et al., 2011). The pollens have great value in germplasm form for ex situ preservation as restoring diversity in a large population of tree (Towill and Walters, 2000).

2.9.1. Biobanks for Forest and other Plants

In the forestry an innovative approach was made in which short term conservation of plants to a fluctuated environment and long-term conservation for the future use to escape from extinction were adopted (Von Detten 2011). With the aspect of everlasting change has some issues like unexpected future in adoptive approaches. The dynamic strategies of species preservation have advantage due to evolutionary nature of preserved specie (Lefèvre et al. 2014).

Medicinal biobanks comprise the collection of organism body or its parts, preserving and using them for reproduction, transformation, or diagnostic purposes. There are several problems for conserving organisms such as its management, maintenance and other related activities. The first ex situ conservation was made by Nikolai Vavilov in 1920s who opened a new window for preservation of an organism. This was the systematic start of collecting and conserving genetic material of cultivated plants (Fenzi and Bonneuil 2016).

2.9.2. Biobanks for Animals

The epidemiological and public health research scientists focused on the environmental determinants of health and diseases. They also take the genomic variant as center of their attention. The advancements in genomics have changed these approaches (Brand and Probst-Hensch, 2007). Biobanks support the health care effectively by intention and validation of markers of some diseases and therapeutic applications. The imaging biobanks are recent trends of biobanking which are used to improve health care.

2.9.3. Fungi Biobank

The symbiotic associations of Arbuscular mycorrhizal (AM) fungus are prominent with many of the plant species. Its colonies on surrounding the

root systems increase the uptake of nutrients, enhance drought tolerance and plants give protection to fungi against various pathogens (Khaliq et al., 2001). The genetic material preservation of AM (arbuscular mycorrhizal) is necessary on urgent basis through the cultivation under nature and artificial conditions. The general approaches of arbuscular mycorrhizal are of two kinds like field based and laboratory based conservation. In field based or *in situ* AM fungi preservation occurs in natural habitat where they grow naturally and have been evolved themselves such as national parks areas and nature reserves ecosystems where wildlife is under the observation of authorities, characterize an appropriate area for *in situ* protection of AM fungi (Chellappan et al., 2001).

3.0 Morals and ethical issues of biobanking

In many aspects of biobanking ethical concerns are generally exist because the biobanks involved the human occupying their autonomy that produce a large number of moral issues (Budimir et al., 2011). The importance of moral legal and issues of society are mainly found in society as confirmed by the many trustworthy journals that focus on the review committee to solve such questions. Now the journal asks the approval letter to proceed authors research articles (Riegman et al., 2008).

The major ethical troubles are following knowledgeable consents, confidentially, data repetition (Cambon et al., 2007). Generally, biobanks need an international advice and collaboration, funding agencies, ethical clearance with a good governing body.

3.1. Informed Consents

Informed consents have three elementary constituents like one is sufficient information, second is voluntariness and third is the capability. First concern in consenting participants must be aware about the research purpose. He also be informed about possible risks and benefits of research and should be free about his research to perform (Kinkorová, 2016). A terminology and nomenclature have been projected by European medicines specialist which is implemented by intercontinental conferences of harmonization of practical necessities (Guideline, 2007). Nomenclature includes identifications of samples and data which are categorized by particular identifier like name or number in data is coded. So once the link is deleted then tracing of samples and data become impossible (Lunshof et al., 2008).

3.2. Confidentially, Privacy and Protection of Data

The data safety and privacy is the rudimentary right of human beings that required for the protection at all time (No, 1982). Personal information and communication should be controlled and confidentially it is the basic desire of every participant in research. Data protection indicate the privacy of data and samples. Another important issue is data ownership. There are various stake holders are present in the biobank such as funding and donors. The biobank should hold custodianship (Vaz and Srinivasan, 2014). The process of harmonization is required for sharing data and many others procedures in biobanks. It is flexible approach for data exchanging in biobank (Burton et al., 2011).

3.3. International standards

The awareness about high quality samples have been increased which is suitable for particle diagnostic purpose. The genomic and proteomic studies need the biology samples from groups of extensive geographical zone to attain statistical necessities. So, it is essential to harmonize the criteria for specimen collections according to internationally admitted prospectus and standards. About 70 scientists over 30 states established Working Group associated with a Technical Committee on ISO level (ISO/TC 276). They made collective efforts to arrange an International Standard. This panel nominated 14 national and international guiding principles and standards linked to activity and evolution of biobanks. The examination of these contents exhibited greater than 85% similarity in their content. This essay is a quint core of the certain strategies and standards to bio-banking. This Group endeavored to sensibly balance the necessities for bio-banking of biological resources from human beings, plant, microbes and animals. They decided to grow an overarching standard valid to all the organizations involving bio-banking of bio-logical specimen from multicellular and unicellular organisms (Musameh *et al*., 2008).

3.4. Biobank's role and challenges for research biobank

Biobanks often play their role very well while are unappreciated by the biomedical study, in innovation, drug development and preventive

techniques for a variety of diseases. The investigators create collections in the support of a particular study area and set of study projects. The biobanks infrequently implement guidelines for according to the modern biobanks (ISO 20387) and thus they face the negative consequences for quality, (Compton *et al.,* 2018) utilization, (Henderson *et al.,* 2019) and reproducibility of studied data (Freedman et al*.,* 2015). The biobanks which involve strong business management and scientific procedures with standards may be reliable with great quality as modern bio-banking (Simeon et al., 2015). The COVID-19 had blowout quickly everywhere in the world which affected countries badly not only with mortality and morbidity also with economically. Presently this pandemic lasts at diverse phases in many countries along with new variant (Knight et al*.,* 2015). In several cases, biobanks sustained its operations with their core personnel and scope constraints in places on sustaining activities upon the pandemic (Hofman et al*.,* 2015).

3.5. Quality management system

Quality management system (QMS) is enormously convenient dealing with complexity, to detect the desires of employers and stakeholders. It validate the protocols to fulfil the needs, evaluate risks and take actions for persistent upgrading to touch the goals of gene bank. The strategies of worth administration of genetic banks are extremely variable. The 30% of banks stated taking formal QM system and 41% of banks establishing the process of QM system. Almost all banks informed for implementing several features of quality management systems. The genomic bank proportions with individual features and activities varied significantly. Compliance was in general common for technical traits of genomic bank like standard techniques for process, freezing (88%) and quality of processed samples (77%).

3.6. Safety challenges

With the start of COVID nineteen pandemic, very a smaller number of biobanks were agreed to handle the COVID virus samples along the world. Some scientists of the African countries were experienced of such type of viral diseases like HIV, Congo and Ebola virus (Abayomi et al., 2013; WHO 2016).

In general standard the human related samples must be treated according to the universal best practicing precautions inside the infections controlled laboratories and also in such type of well-established biobanks. The minimum BSL-2 biosafety level or higher level BSL-3 facilities should be carried out while handling the samples from COVID-19 containing live corona virus.

3.7. Sustainability of Biobanks

Recently, the demand of COVID-19 samples and their data is very high across the globe. As a new COVID variant start to spread the demand of their samples also increases and their research access data demand increases to save in databases (NIH, 2020). The relevant Organizations also provided portal to collect research data and also boost up the research activities associated with COVID especially vaccine and drug therapy (Thanh et al., 2020).

However, as the FDA approved vaccine or drug comes into market the demand of samples may be decreased to some extent. But the process of creation of new drug or vaccine take long time and here in this scenario the COVID vaccine preparation took less time as compared to conventional outbreak's vaccines and bio-bankers are still collecting and preserving samples and data to determine the immunity wanes and potential requirement for a booster vaccination (Sharpe et al., 2020).

Conclusion

The biobanks are playing key role in the progressing of world community. The large number of projects integrate biobanks foundation from the BBs. These foundations helped the experts to run the extensive analysis with good significance. Moreover, these are also beneficial for the health of a human patients. The mass processing having lower cost and good standard gives assistances to the contributors in the way of knowledge about genome prophecy with deterrence advice. This progressing improvement is funded by international organizations that helped for creation of a new biobank by using their long time experience. The support of these organization is a key for the future biobanking developments.

Competing Interest Statement: The authors have no conflict of interest.

List of Abbreviations: QMS, Quality management system; DNA, Deoxyribonucleic acid; AM, arbuscular mycorrhizal; BSL, Biosafety level; COVID, Corona virus disease; ISO, International standard organization.

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