ISSN (Print): 0974-6846
Indian Journal of Science and Technology, *Vol 11(41), DOI: 10.17485/ijst/2018/v11i41/132474, November 2018* ISSN (Online): 0974-5645

3D Bio-print: A Socio Ethical View of Bioprinting Human Organs and Tissue Structuring

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Abstract

Objectives: To analyse fabrication of artificial tissues and organs for future transplants, to identify effectiveness of 3D bio printing in operating various medical issues and to resolve the patients-specific cancer or relevant diseases through proper therapy. **Methods/Statistical Analysis**: This report is also consisting of the debates from various authors will be helpful for making effective determination of all operations. However, this thematic analysis will be helpful in bringing a clear view over this bio-engineering technique. However, in the recent time, there have been influences of various techniques and methods for developing and restructuring the organ such as artificial leg, hand and several parts of body. **Findings:** As per analyzing the applied technique for detruding the t-test statistics on which it can be said that, the t value is 4.97, sig. 2 tailed is 0.001. Therefore, the p value is less than 0.05 which insist that, there is a significant mean difference between 3D bio printing and development in medical facilities. And One-way ANOVA: To analyze outcomes based on dependent variable and independent variable on which hypothesis has been addressed. Thus, as per the signification value which is 0.610 as more than p value (0.05)? Thus, it can be said that, there is no significant mean difference between 3D bio printing and development in medical facilities. **Application/Improvements:** The gathered data was analysed by implicating statistical tool which brings positive outcomes. Therefore, implication of this technique will be helpful in resolving medical issues.

Keywords: Bio-print, Bio-engineering, Organs, Socio ethical, Tissue Structuring

1. Introduction

Revolution and reforms in bio medical field is necessary to resolve various medical issues. 3D bio printing of human organs and tissues will be an innovative idea that has up lifted technique of tissue engineering. The major advantages and influences of this technique are to mimic the macro and micro environment of human body tissues such as in stem cell and creating artificial organs.

In the present research study, there will be analysis made on various fields and operations of activities which will be suggestive in uplifting level of science in society. Thus, bringing this technique in all segmentation of world and also in every field encourages society towards health awareness. This research will also consist of various literature reviews and methods to be addressed in analysing the environment. Moreover, there will be use of various research methods and techniques for analysing issues and collecting information from environment.

2. Main Body

2.1 Research Aim and Objectives

To analyse implication of 3D bio-printing for identifying health issues and in better determination of diseases is quite necessary in medical and science. However, there can be various aim and objectives to the research study which are needed to be addressed by professionals such as:

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2.1.1 Aim

To implicate 3D bio printing technique for reducing biomedical challenges in society for developing tissues and organs.

2.1.2 Objectives

- To analyse fabrication of artificial tissues and organs for future transplants.
- To identify effectiveness of 3D bio printing in operating various medical issues.
- To resolve the Patients-specific cancer or relevant diseases through proper therapy.
- To suggest implication of effective techniques for bringing reforms in medical field.

2.2 Research Questions

- How to analyse fabrication of artificial tissues and organs for future transplants?
- What is the effectiveness of 3D bio printing in operating various medical issues?
- How to resolve the Patients-specific cancer or relevant diseases through proper therapy?
- What are the suggestions that will implicate effective techniques for bringing reforms in medical field?

This part of research study will emphasis on analysing all possible issues in the medical field which will be resolved through bringing reforms and innovation in technologies. There will be influences of various thoughts and details about bio-medical activities and the current obstacles stated in society. The debates from various authors will be helpful for making effective determination of all operations. However, this thematic analysis will be helpful in bringing a clear view over this bio-engineering technique.

2.2.1 Theme 1: To Analyse Fabrication of Artificial Tissues and Organs for Future Transplants

According[1] transplant helps a person in overcoming with the life-threatening diseases as well as benefit them in recovering from medical issues. It brings the new life and help patient for better living. Currently, there can be various medical challenges which were being faced by society such as insufficient transplant and rejection of changes by body. Therefore, it helps in diagnosing the diseases and improves decisions making of medical professionals for resolving issues. In[2] stated that, this 3D printed medical devices will bring proper inspection of all the issues in case of disease like cancer, orthopaedic problems, heart, liver and various tissues relevant issues will be diagnosed as well as resolved. It will be a reforming operation that in turn will help in uplifting operational advantages in the field of science.

As per the views of[3] reforms and innovation in medical will be much effective as it resolves various major issues and bring a new life to the individuals. Through 3D bio-print it brings a visually accurate view of organs that helps in treating the patient and make proper analysis over health obstacles.

However, in the recent time, there have been influences of various techniques and methods for developing and restructuring the organs such as artificial, leg, hand and several parts of body. Main approaches of scientists for bringing the artificial face, eyes etc. will help society[4] stated that, the costs of implication of such techniques into operations will be higher than the traditional methods of transplanting organs. Moreover, this technique will not be affordable by all individuals with respect to have property medication and treatment to their diseases.

2.2.2 Theme 2: To Identify Effectiveness of 3D Bio Printing in Operating Various Medical Issues

In[5] demonstrated that to improve health prosperity of people, there will be need of having appropriate therapies and medical influences for managing the obstacles and bringing a healthy life to an individual. In 3D bio printing the genetic designs of an organ have been estimated and analysed by computer software. Which creates a blue print and then present allowance to that drafted design which will be proceed for constructing the tissues. This bio engineering approach will create an opportunity for handicapped and disabled people for better life span[6] said that, implants or replacement of any organ will be based on proper investigation and body history of a patient. Thus, suitable treatment will bring effective results and body will respond in the same manner.

2.2.3 Theme 3: To Resolve the Patients-Specific Cancer or Relevant Diseases through Proper Therapy

As per the views of[7] in respect with diagnosing the cancer and relevant diseases there will be main role and effective

impacts on health. Cancer at any part of the body requires that particular portion to be removed or replaced. This disease is known as uneven growth of cells which will regularly grow and damage a body. To overcome with such issue, it is necessary to have proper information about proper area which is damaging the body. It will be innovative and reforming influence for treating cancer at any part of the body[8] demonstrates that to remove these causes, which leads higher death rates in every economy. Thus, bringing this technique will help doctors or scientists in better research and discovery of techniques that will be helpful in bringing better medical facilities to patients.

According to[1], the molecular profiling helps in realising cancer in a patient which allows doctors for better personalization and medication to that individual. Moreover, the main motive behind implicating such medical help is for developing companion diagnostics. Therefore, there will be identification of specific mutation for specific patient. Along with this, developing drugs and treatment for each patient will be exact and accurate in resolving their issues[2] define that, there are several viral diseases which also affect a human body and are life threating such as Ebola, HIV etc. thus, to resolve such issues which requires proper R and D on medicines. To analyse these issues bio-engineering plays the main role in analysing body strength of an individual and level of drugs will be handled by them.

2.2.4 Theme 4: To Suggest Implication of Effective Techniques of Bringing Reforms in Medical Field

As ascertained by[3] increment in medical practices such as bringing technical influences will be helpful in presenting proper knowledge and information about serious diseases. It will positively affect in making proper training to the medical practitioners in learning and developing fruitful medication. It will be a great approach in the field of proper research and development of medicines that will bring prompt results in recovery of a patient[4] stated that implications of such technology will bring drastic changes in the medical history. There can be reduction in the dependency of an individual on a donor of any organ.

According to[5] liver and heart cells were made by the birth of a human being. Thus, creation and recovery of these organs are the main challenges in the medical science. Therefore, people started depending on donor of these organs. Most of the time organs which were transplant and replaced in a body do not work adequately as well as do not respond properly. It charges higher costs to the patient as well as also brings them the dissatisfaction with surgical operations. Moreover, implication of such techniques will help in improving medical facilities all over the world[6] presented that 3D printing will be termed as tomorrow's medicine which will make rapid changes in operation tactics, medication and treatment to any life-threatening diseases.

2.3 Literature Gap

Analysing issues and conducting an appropriate determination of all facts require proper implication of journals and articles to be examined. Thus, the reviews of various authors in the field of medical and sciences were discussed on which there are still some issues which were not being discussed or analysed. Improper number of sources as well as time management has made influences in non-profitable analysis.

2.4 Research Methodology

2.4.1 Research Philosophy

To study the facts which are the main cause in a research study there will be use of appropriate methods and techniques that helps in developing new theories to be implicated. Philosophy is consisting of various types among them Interpretive has been selected by researcher in this study[9]. It will bring in-depth analysis about the issues with investigating data through qualitative techniques.

2.4.2 Research Design

There are two designs which have been operated by researchers in studies such as inductive and deductive. To analyse the reviews of medical professionals as well as exploring a revolutionary phenomenon which will help in making proper determination and examination of all facts? Thus, with influences to the same the scholar has selected Inductive methods which will bring authentic information.

2.4.3 Research Approach

Qualitative and quantitative are the two approaches which were usually addressed in a study. In the present

research to analyse effectiveness of 3D bio print there will be implication of quantitative analysis. It consists of descriptive statistics which governs proper analysis of data base[10].

3. Sampling

In relation with conducting a fruitful research study over the facts there will be requirement of sampled which are required to study. In relation with analysing the importance of 3D bio printing there has been collection of data from randomly selected 10 medical practitioners. Thus, they will be asked several questions and their reviews will be helpful in making proper judgment on the research issues.

3.1 Data Collection

Collecting information will bring details about research issues and obstacles will be analysed for drafting proper conclusion. There are two techniques such as primary and secondary which will be helpful in gathering information and analysing them for bringing proper analysis on operations. Primary research is consisting of implicating the initial methods such as asking questionnaires, focused group analysis, interviews etc. while secondary examination refers to analysing journals, articles, books and various sources through internet. In the present research, scholars have aimed at operating the research through primary methods.

3.2 Data Analysis

After gathering the relevant and authentic data and the opinion of various medical practitioners will be analysed by scholars to draft the valid conclusion[11] on the basis of such data base the importance of implicating 3D bioprinting will be examined and professionals in medical sector will be suggested in implicating reformative development into practice.

3.3 Ethical Consideration

As per analysing all the sources and opinion of individual researcher has make efforts in collecting information as well as arranging them in a way that will bring proper justifications and reviews regarding research issues. Consideration of all research ethics and regulation has helped in giving a legal look to the report.

3.4 Reliability and Validity

In analysing the research issues there is need of having reliable and valid information which will bring clear analysis and information about research study[12]. In the present research project there have been influences of various details which were being derived from the authentic sources. All the resources were listed in reference list as well as in text in the content to give report a legal look.

3.5 Research Limitation

As per collecting information and making proper examination of the facts there were various obstacles which have been faced by researcher. Time limit awarded to conduct this study was the main issues there are various authentic and reliable sources were not being studied due to improper time as well as responses from medical practitioners.

4. Statistical Data Presentation

- **Null Hypothesis (H0)**: There is no significant mean difference between 3D bio printing and development in medical facilities
- **Alternative Hypothesis (H1)**: There is a significant mean difference between 3D bio printing and development in medical facilities as

T-test:

5. Analysing the Data

T-test: As per analyzing the applied technique for detrending the t-test statistics on which it can be said that, the t value is 4.97, sig. 2 tailed is 0.001. Therefore, the p value is less than 0.05 which insist that, there is a significant mean difference between 3D bio printing and development in medical facilities. As shown in Tables 1 and 2.

Descriptive Statistics: Questions have been asked to the professionals as per their opinion regarding implication of 3D bio printing. Moreover, it can be said that, there are positive reviews from all questions which were being asked to them. It can be said that; this technique will be helpful in uplifting the medical activities. As shown in Tables 3-6.

One-way ANOVA: To analyze outcomes based on dependent variable and independent variable on which hypothesis has been addressed. Thus, as per the signification value which is 0.610 as more than p value (0.05)? Thus, it can be said that, there is no significant mean difference between 3D bio printing and development in medical facilities as shown in Table 7.

Table 1. One-sample statistics

	N	Mean	Std. Deviation	Std. Error Mean
Question 1: What is your opinion about, the fabrication of artificial human organ and tissue will bring positive reviews in future transplant surgeries?	10	2.20	1.398	.442

Table 2. One-sample test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Question 1: What is your opinion about, the fabrication of artificial human organ and tissue will bring positive reviews in future transplant surgeries?	4.975	9	.001	2.200	1.20	3.20

Table 3. Question 1: What is your opinion about, the fabrication of artificial human organ and tissue will bring positive reviews in future transplant surgeries?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	40.0	40.0	40.0
	2	3	30.0	30.0	70.0
	3	1	10.0	10.0	80.0
	4	1	10.0	10.0	90.0
	5	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Table 4. Question 2**:** Is the 3D bio printing effective in addressing the medical health issues or diseases?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	60.0	60.0	60.0
	2	4	40.0	40.0	100.0
	Total	10	100.0	100.0	

Table 5. Question 3**:** Does this technique will be helpful in resolving the life-threatening diseases like cancer, HIV, Tuberculosis etc?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	40.0	40.0	40.0
	2	2	20.0	20.0	60.0
	3	2	20.0	20.0	80.0
	4	1	10.0	10.0	90.0
	5	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Table 6. Question 4: Does the application of such technique will bring reforms in medication and operations?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	30.0	30.0	30.0
	2	3	30.0	30.0	60.0
	3	2	20.0	20.0	80.0
	4	1	10.0	10.0	90.0
	5	1	10.0	10.0	100.0
	Total	10	100.0	100.0	

Table 7. Question 1: What is your opinion about, the fabrication of artificial human organ and tissue will bring positive reviews in future transplant surgeries?

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.600	1	.600	.282	.610
Within Groups	17.000	8	2.125		
Total	17.600	9			

6. Conclusion

On the basis of above research, it can be said that, implication of 3D bio printing has helped the medical sector in various operations. It includes various bio engineering of organs as well as tissues which will be helpful in securing life of people. Moreover, the gathered data was analysed by implicating statistical tool which brings positive outcomes. Therefore, implication of this technique will be helpful in resolving medical issues.

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