



RISK AWARENESS AND EXISTING KNOWLEDGE OF PEOPLE ABOUT BIOMEDICAL TECHNIQUES

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ABSTRACT

Biomedical techniques are the latest techniques which are being used to treat and monitor many diseases, e.g. cancer, diabetics etc. and they are quite advanced and different from traditional techniques. They may have many benefits over traditional/existing techniques, but they may also have certain limitations. To overcome any such risks and limitations, biomedical research is being carried out either to improve or identify new approaches. The objectives of this research work were to know the awareness among people about these biomedical techniques, their benefits and risks involved and the extent of their preference towards the latest biomedical techniques. From the results of the preliminary survey, it was found that maximum numbers of participants were only aware about the conventional techniques that are being used to treat cancer, diabetes and asthma. It was also found that only 44% of the population was aware about tissue engineering. Among the population studied 77% of the people were not aware about risks involved in biomedical techniques, but many of them preferred benefits generated by biomedical approaches over the possible risks associated with them. However, this preliminary survey conducted with a small population suggested that awareness seem to be poor about biomedical techniques and there is an urgent need for awareness programs.

KEYWORDS: Biomedical techniques, risk awareness, human health, risk, benefits, traditional treatments.



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INTRODUCTION

Biomedical techniques are the latest techniques which are being used to treat life threatening diseases and health affecting diseases. They are quite advanced and different from conventional techniques. They may have many benefits over conventional or existing techniques, but they may also have certain limitations and risks. The risks in biomedical techniques are different for different techniques that are used for different diseases. For example chemotherapy, radiotherapy, and positron emission tomography (PET) are used to treat cancer and they involve medical risks and side-effects like pain, nausea and vomiting, and hair loss. Similarly insulin pens and insulin jets are used to treat diabetes mellitus and they also involve risks and side-effects like hypoglycaemia, lipodystrophy etc. In order to understand the public awareness of these risks, survey must be conducted to analyse these risks that are known to exist. Risk is the potential that a chosen action or activity will lead to a loss. The notion implies that a choice has an influence on the outcome exist. Risk assessment is a step in a risk management process. It is the determination of quantitative or qualitative values of risks related to a situation and a recognized threat. Risk assessment consists of an objective evaluation of risks in which assumptions and uncertainties are clearly concerned and presented. Risk assessment in the context of public health is the process of quantifying the probability of harmful effects to an individual or population. Risk analysis is a procedure to identify threats and vulnerability, analyse them to a certain exposure and highlight how the impact can be eliminated and reduced. There is a need to study about risk factors which are involved in biomedical techniques. By knowing about public awareness of these risk factors only further biomedical research can be done to overcome these risk factors and the public should be educated on the importance of the treatment, as biomedical research is all about inventing new safe techniques and methodologies to treat as many diseases as possible or save as many people as possible.

India is now considered as one of the significant players in international biomedical research, because of technology potential, the Indian government's encouragement, suitable atmosphere with better reforms and trained technicians. Clinical trials in India have been growing at an annual aggregated growth ratio of more than 60%. In 2004, the budget for clinical trials in India had crossed USD 100 million and in 2010, the industry has reported to spend USD 300 million or more. Availability of a huge pool of trained manpower, a large population base with a diverse disease spectrum and cost effectiveness have been considered as possible reasons working in favour of India. Current trends as well as challenges posed by demographic growth suggest that biomedical research is expected to continue to have substantial growth in developing countries, like India. Without sufficient efforts, the costs of healthcare are likely to become greater in the years to come. Appropriate awareness policies should therefore be implemented in order to address those biomedical issues that cause the strongest effects on human as well as environmental health. Despite the considerable progress in managing human health, it is generally recognized that the lack of data on the uses and effects of biomedical substances and the products developed from these substances is a major handicap. Only when such information is available, it will be possible to properly evaluate the consequences of the discharge of biomedical waste and to ensure that the most effective biomedical safety policies are in place.

Risk assessment studies have gained a lot of importance to assess the quality and quantity of services provided to the human population. Different proposals have been made for risk management. Olson and Wu (2010) analyzed various earthquake risk management tools and proposed different risk management approaches to deal with post-construction issues in the Sichuan earthquake in China. In Europe, risk from natural disaster-triggered events are referred to as Natech (Cruz et al. 2006). A systems approach is required to clarify and quantify important interdependencies that affect inter sectional

functionality, and that underpin effective policy formulation for risk assessment (Thomas et al., 2012). Nowadays, scientists are working to improve the practised techniques in biomedical field and to overcome the risks involved in them, so that more and more people can safely avail these techniques. The biomedical techniques are far better than the conventional techniques but most of the population may not aware of these new techniques. So, the objective of this paper was to analyse the awareness among the people about various techniques and also the risk involved in them. Using surveys, information about the behaviors, needs, and opinions can be collected. These surveys help us to find out attitudes and reactions, to measure the satisfaction, to gauge opinions about various issues, and to add credibility to our research. Surveys will obtain first hand information by directly asking someone for a response to a question, rather than collecting information from any secondary sources like written records. Biomedical techniques are used to treat many different diseases but in our study only three major diseases such as cancer, diabetes and asthma were taken as nowadays these are considered as quite common diseases. All the possible techniques involved in these diseases have been taken into consideration. Also, three major and latest biomedical techniques which are used to treat many diseases were taken into account and they are tissue engineering, stem cell therapy and drug delivery system. Surveys can be conducted very simply, or very complicated, depending on how much you want to ask on the survey and the number of people to whom it is administered. This study mainly focused on doing surveys on a fairly small local scale, and we present some ideas based on the survey about the awareness level of the sampled population.

MATERIALS AND METHODS

For the purpose of conducting survey, a questionnaire was prepared. To prepare the questionnaire, extensive literature survey was carried out from different sources and using those information, questionnaire was prepared focussing on the general information about the participants, three main diseases, the

techniques used for the treatment and the limitations of these techniques, latest biomedical techniques and the possible risk factors involved and the awareness among people about the on-going biomedical research. This present preliminary survey was conducted during October-November 2011. The survey population was from different educational backgrounds (undergraduate, postgraduate and doctorate) and they all were from different fields of specialization such as core engineering, management, medical and biotechnology. The survey population consists of 39% males and 61% females.

Questionnaire

A questionnaire was prepared to ascertain awareness among people about the risks involved in biomedical techniques. The questionnaire was divided into four parts. First part focused on the background of the participating people like their age, educational qualifications, their health status etc. Second part involved questions related to different diseases and techniques employed in their treatment for cancer, diabetes mellitus and asthma and also their side effects and risks involved. Third part focused on the awareness among people about latest biomedical techniques such as tissue engineering, drug delivery and stem cell therapy and their applications. Fourth part involved questions related to biomedical research and this part concentrated on the awareness among people about the on-going research to overcome of the risks involved in biomedical techniques. Questions were also asked about their preference over traditional techniques, risks over benefits etc. Questionnaires were sent through mails, and 45% of the population replied and the remaining did not answer (refusal, lack of knowledge or possible no receipt of mail). To conduct direct personal interviews, many people were approached, but 73% of the population answered the questionnaire and remaining did not answer (preoccupied). The collected data were analysed and prepared figures to present the results.

RESULTS AND DISCUSSION

Since it was a preliminary surveying comprising a small population, no statistical treatment could be done. Furthermore, no such survey results are available for any kind of comparison with the results of the present study. The results of this survey suggest that such survey should be conducted over a wide range of Indian population to plan proper strategy for biomedical research.

General feature of the sample population

Of the samples analysed, 61% and 39% of them were female and male, respectively. Major population involved in the age group of 25-30 years and few samples were in the age group of above 35 years. They have different educational backgrounds as majority of them were undergraduate and postgraduate, only few of them were doctorate degree holders. The sample contains almost equal population who were quite health conscious as almost half of the population did physical exercise daily and maximum preferred half an hour to two hours exercise and remaining population did not do any physical exercise. Among this population, 89% people were not smokers and also 84% people were not at all exposed to passive smoking suggesting that these

people must be aware about the side effects of smoking. Majority of population did not undergo any regular medical check-up, only few people checked for glucose, blood pressure and cholesterol monitoring regularly. Also 50% of the population had medical check-up only once in a year and the rest of the population took medical check-up, few once in a month or once in three months or once in six months. Among this population, 76% population rated their health good, 80% fair, 4% excellent and only 2% poor. These results suggested that majority of the population were health conscious and they were all seemed to be healthy.

Study about awareness of diseases and techniques

Analysis was done among the survey population about the awareness of treatment for various diseases and the results revealed that according to 43% population, cancer is curable, 32% felt that it was non-curable and 25% considered that it was fatal. Also this survey revealed that the public were not aware about the techniques used to treat cancer as 19% population was aware about surgery, 25% about chemotherapy and 20% about radiotherapy and only few people were aware of other techniques (Figure 1).

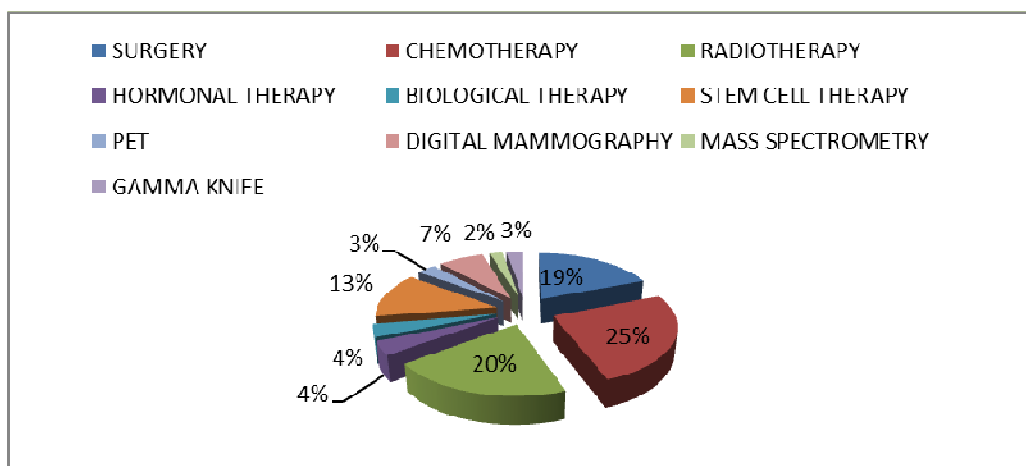


Figure 1

Percentage of population who were aware about different techniques used to treat cancer.

Awareness about the side effects among the population was also collected and the results showed that participated population was not fully aware about the side effects properly (Figure 2) as 22% people knew about hair loss, 18% about pain, 17% knew about the nausea and vomiting whereas awareness about other techniques was seemed to be very poor.

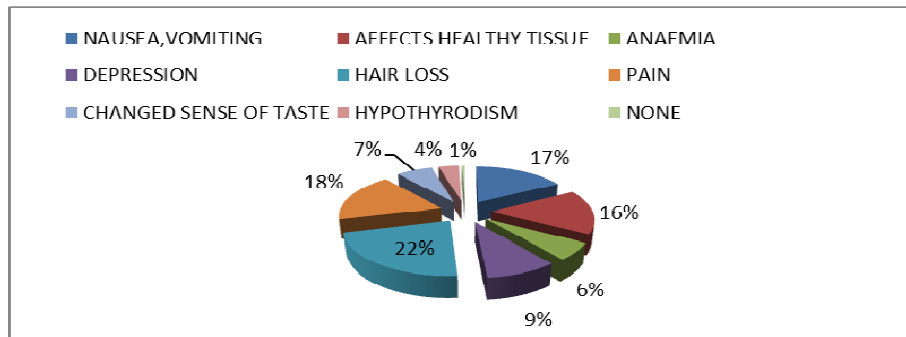


Figure 2

Awareness about side effects of the techniques used in treatment of cancer.

Data on diabetes mellitus were also collected in this study and it was found that according to 42% population, this was curable and 53% believed that it was non-curable. The proportion of population who were aware about the treatment techniques was relatively small; 35% population knew about insulin pens, 27% had knowledge about needles and syringes, 23% opted for insulin jets but poor awareness about other techniques such as stem cell therapy and inhalers, was revealed, but population was also aware about the side effects of these used techniques (Figure 3).

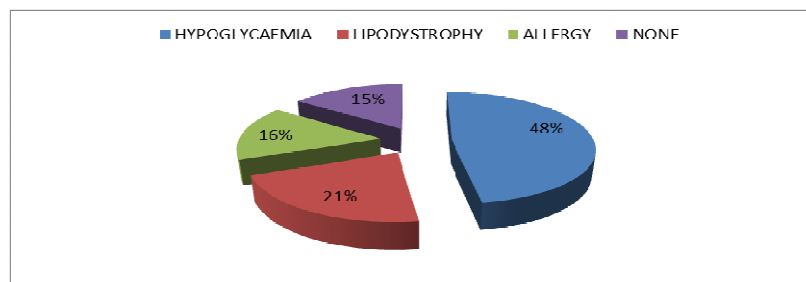


Figure 3

Percentage of population which was aware about the side effects of the techniques used to treat diabetes mellitus.

Another common disease in India, asthma and its awareness was also surveyed. According to 54% of population, this disease was curable and 44% said it was non-curable. Awareness among people was analysed about the techniques used for the treatment of this disease and the results suggested that public awareness about those techniques were good. The results on the effects of the techniques showed that people were also aware of side effects very well (Figure 4 & 5).

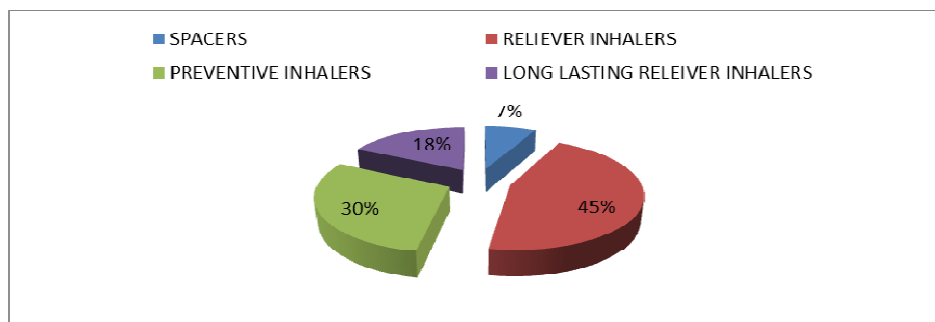


Figure 4

Awareness about techniques used to treat asthma (%).

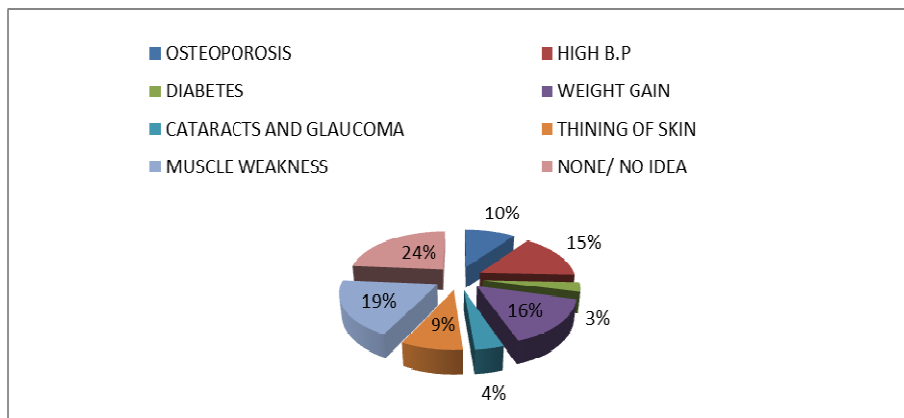


Figure 5
Percentage of population aware of the side effects about the techniques used.

Awareness about tissue engineering was also analysed and it showed that 44% of the population was aware of tissue engineering and 56% did not know about tissue engineering. Of the population who are familiar with tissue engineering, 92% of the population was aware of the applications of the tissue engineering while 8% were unaware of the applications. Nearly 46% of the population was unaware of the limitations of tissue engineering. Most of the population who knew about tissue engineering, also knew about the benefits of tissue engineering and 16% of them think that using tissue engineering would minimise the need for donor cells. Others think that it was cost effective or it was directed towards individual patients. Nearly 17% of the population was not aware of the benefits (Figure 6).

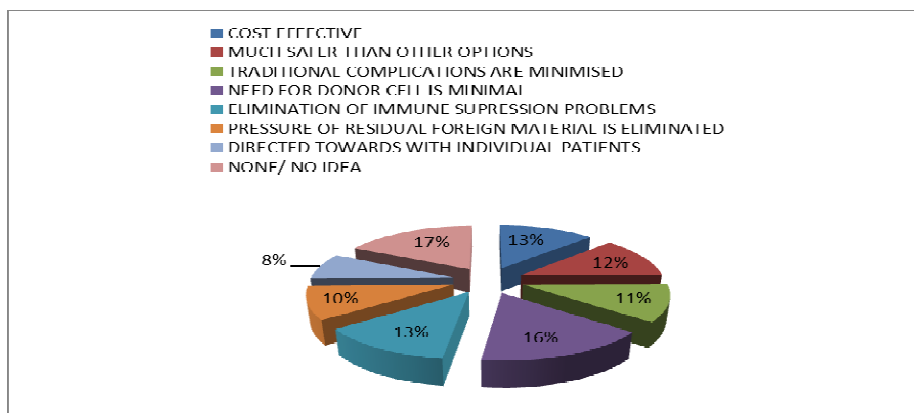


Figure 6
Percentage of population who were aware of the benefits related to tissue engineering.

Drug delivery methods were also taken into study and it was found that 58% of the population were aware of the side effects and 42% were not aware of them (Figure 7). Most of the population think that the infection was the most common side effect of drug delivery. It was also found that according to most of the population the benefits of drug delivery was that it provides faster cure to any disease and also that it provided most specific drug targeting. 24% of them were not aware of its benefits.

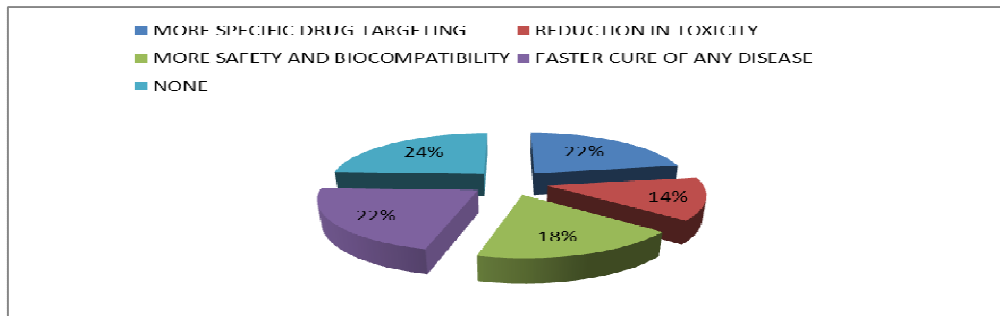


Figure 7
Percentage of population who were aware of the benefits of drug delivery.

Stem cell therapy was also taken into this study and majority of the population were aware of the importance of stem cell therapy. Most of them preferred benefits over ethical issues while 28% of them were in favour of ethical issues. According to them, the main limitation of stem cell therapy was ethical issues and 28% were not aware of the limitations (Figure 8).

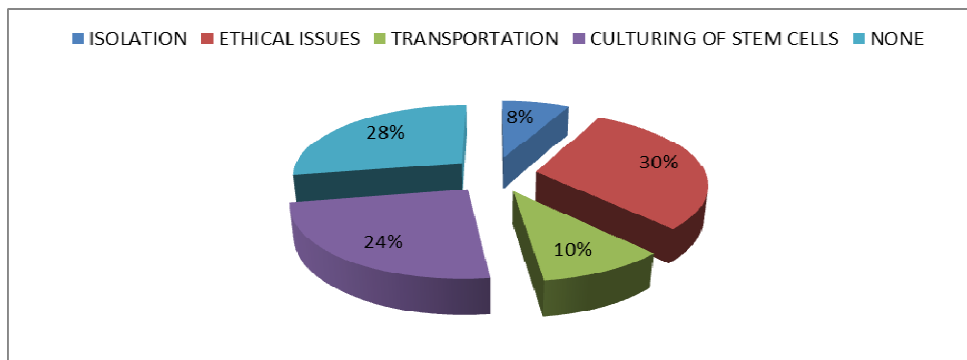


Figure 8
Percentage of the population aware of the limitations of stem cell therapy.

Awareness of the risk factors was studied and it was found that 51% of the population were aware of the risks associated with the biomedical research. According to 16% of the population, the most common risk was the trigger of immune system. 41% of them said that the need for stem cells was for picking up the best cells (Figure 9).

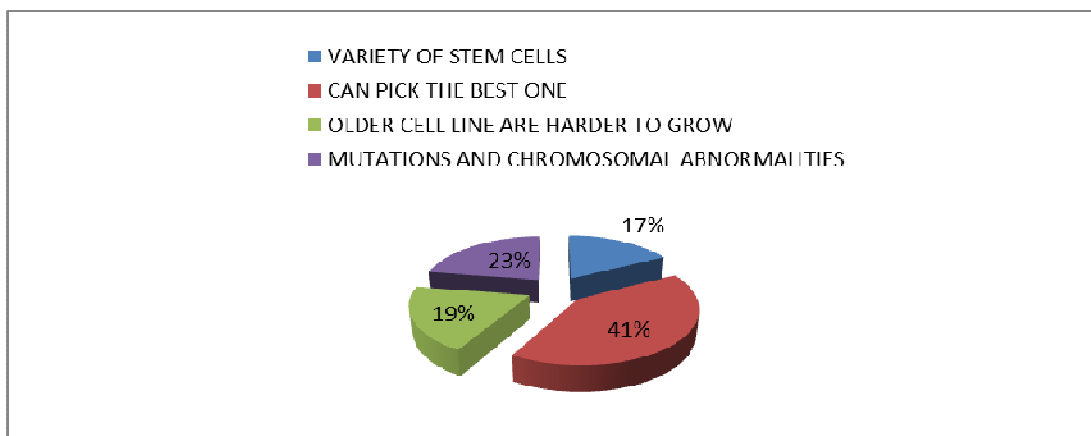


Figure 9
Percentage of population who are aware of the need of variety of stem cells to scientists.

Data on awareness of biomedical risks were also collected among the people. This survey showed that most of the people were not aware of the biomedical risks involved, suggesting that they may not be aware of the new and novel developments that are taking place in the field of health sciences. It seems only one third of the population expressed affirmatively about the risks associated with biomedical approaches (Fig. 10).

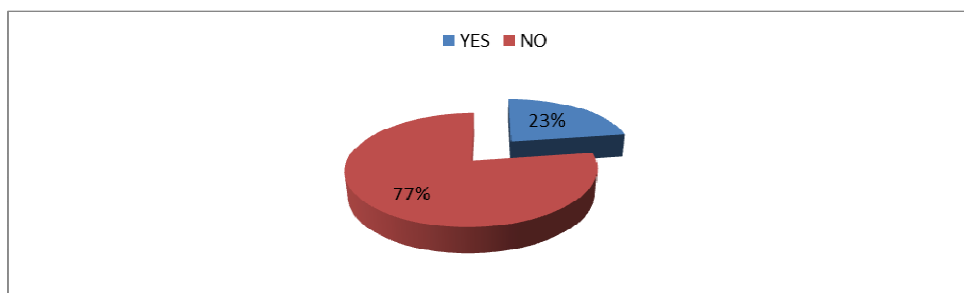


Figure 10
Percentage of the population who were known about biomedical risks.

Most of them preferred biomedical techniques over proven techniques and according to them biomedical techniques would be quite effective in the treatment of most of the diseases. As there are possibilities of increased input of unused and sewage discharges into the environments, the environmental health may get affected by the biomedical waste materials. Increased use of biomedical instruments/equipments may also cause damages to the environments. When the sampled population was asked to indicate their preferences (Figure 11), 59% of the population felt that protection of human health was the more preferred than environmental health (41%).

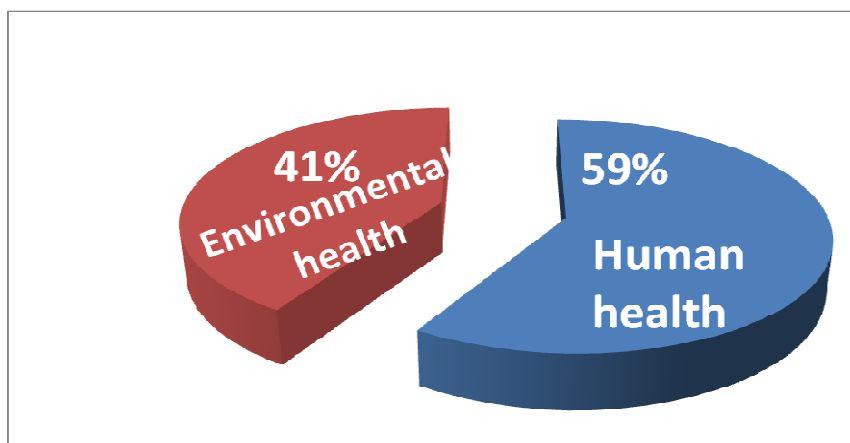


Figure 11
Percentage of population preference of human health and environmental health.

The overall preference by most of the population was given to the benefits of biomedical techniques over the risks that were associated with these techniques. 23% of the population said that they considered risks were more than benefits whereas 15% said that risks and benefits were equal in these biomedical techniques (Figure 12).

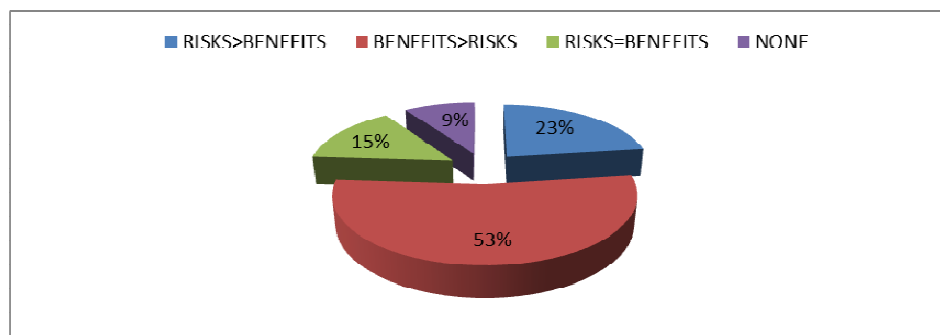


Figure 12
Percentage of population giving their preference in favour of risks or benefits associated with the biomedical techniques.

Further, as more methods and materials are now being introduced in many countries, concerns have also been raised about the lack of information on the release of biomedical wastes from health care centers in both developed and developing countries. Given the rapid rise in biomedical waste in many countries, known and unknown diseases are anticipated to continue to increase, resulting in a growing number of health problems in these countries. Finally, emerging environmental challenges, such as climate change, may result in new, significant damages on human health in the near future. Using risk awareness survey, we can identify those areas where we can make improvements and implement changes to look and be more helpful to human health. This questionnaire results revealed the importance of risk communication and that there still has to be done to improve the awareness. Indeed some people are well informed, and however there is also a large part which is not. Some of the question responses in this survey indicated strong awareness and good health practices while others indicated weak awareness, and negligent behavior. Altogether the people are very open-minded to risk communication. Furthermore, majority of people questioned would like to know more information on environmental health, if necessary. There are only very less ones who do not know recent developments at all. One of the preferred sources for the information transfer is the internet, which has been accessible now to a lot of people.

The present survey helped us to measure ideas or opinions of biomedical

issues related to our objectives. Results of this small survey allowed us to understand how many people use latest techniques, what users think about available treatments, what they expect from scientists, and whether they are satisfied with what is available. A well-executed survey can provide a wealth of information about the constituents and their needs. This present study has given us the basic information about the awareness and however, there is a need to conduct surveys that are effective and that give us the information we need to serve our communities better. There are many risk assessment models currently used as tools to assist in the assessment of the magnitude of a risk and the probability that the risk will occur. However, the suitability of a specific model for a particular application is always difficult to identify (Keller 2006). Moreover, it is necessary to know the extent of awareness among the population so as to plan and predict the risk factor using different models. The two main types of risk assessment are qualitative and quantitative types. Qualitative risk assessment uses words to describe a risk and it relies on a perception of risk based on expert opinion which has been usually used when numerical data are unavailable. Qualitative risk assessment requires fewer resources and can be a useful initial step in quantitative assessment as it can direct further research. Quantitative risk assessment is more specific because it uses data. It is an assessment used to calculate the probability of an unwanted outcome or the magnitude of an effect.

Risk assessment is a very important tool used to assess the potential of medical risk to human health. To date risk assessment models with regard to pharmaceuticals can be broadly classified into two focused categories: (1) environmental risk assessment and (2) human health risk assessment. In the field of biomedical research, similar risk assessment is required for both new techniques and any existing techniques that show evidence for the need of further analysis, such as increased use. Risk assessment strategies and models prove to be vital tools in assessing the possible risk posed to humans and the environment. It is necessary to assess the health risks before a suitable reduction/elimination process is chosen and applied.

CONCLUSION

The results of the study showed that the awareness among the studied population seem to be poor about the benefits and risks of biomedical techniques. Maximum number of the participants still preferred the proven techniques over latest biomedical techniques due to lack of awareness only. In spite of lack of awareness about biomedical techniques, still few participants preferred the benefits over risks involved in biomedical techniques and few of the participants were aware about benefits but still they were concerned about risks involved in biomedical techniques. Thus people should be educated about the benefits and also possible risks related to these latest biomedical techniques so that maximum number of people can avail these techniques

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with no fear or concern about new developments in biomedical research. The present study was conducted with a small population, but it should be extensively conducted based on region, religion, race etc. so as to obtain a better view about the prospects of future research in biomedical field. Questions on how environment affect human health or vice versa have aroused increasing interest in recent years, particularly since the adoption of new and novel technologies which drew the attention of policy makers to the links between health and the environment. Despite national and international interventions and decreases in death rate, the health issues are not likely to decrease in the years ahead. It can also be said that fortunately there are not so much people who have already been threatened by health hazards. From our preliminary survey, it is recommended that public awareness of the problem associated with biomedical treatment should be communicated. Highly specific methods of testing and reporting are needed and specific acceptable limits in individual environmental compartments have to be determined. There is also a need to fully understand the risks associated with biomedical wastes in the environment to make appropriate decisions regarding mitigation.

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