

Awareness and attitudes of research students towards dual use research of concern in Pakistan: a cross sectional questionnaire survey



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ABSTRACT

Objectives: • Assess the level of awareness and attitudes of research students towards dual use research of concern • Measure the level of consideration regarding DURC while publishing data and experimental protocols • Identify preferred method to learn about DURC

Method: A cross-sectional study was conducted to evaluate the level of awareness and attitudes of research students towards dual use research of concern (DURC) in more than twenty-five universities in four provinces, federal area and Azad Jammu and Kashmir region of Pakistan.

Results: Across the geographic areas targeted, 933 students responded. Most of the respondents (58.2%) never heard of DURC; while 18.5% had heard of the term, but were unsure of its meaning. Irrespective of the prior knowledge, a higher percentage of students (68.6%) felt an obligation to report research misuse. Considering the need for DURC training, 94.1% of the respondents agreed that the principal investigator should train students on DURC at the start of a research project. Almost half (46.2%) of the students indicated that they prefer to learn about DURC through workshops. Few were supportive of learning about DURC using an online approach (5.1%), or as part of the course curriculum (6.3%), and a minority (2.7%) showed no interest in learning about DURC. In case of experimental results having dual use potential, 69.1% indicated they would publish with limited protocol, with 43.5% indicating they would publish the limited protocol only if there was a way for scientists to access their data.

Conclusion: DURC awareness among researchers across Pakistan is limited. It is important to note that the respondents, although not formally educated about DURC, were quite aware of its impact.

Outcomes: The survey results identified significant knowledge gaps. The information will be very valuable in addressing country-specific awareness and training needs.

INTRODUCTION

Dual use research of concern (DURC) is defined as life sciences research that, based on current understanding, can be reasonably anticipated to provide knowledge, information, products, or technologies that could be directly misapplied to pose a significant threat with broad potential consequences to public health and safety, agricultural crops and other plants, animals, the environment, materiel, or national security (1). In 2004, USA's National Research Council (NRC) published Fink Report entitled Biotechnology research in an age of terrorism in 2004 (2, 3). Federal Government of Pakistan, under Pakistan Environmental Protection Act, 1997, established the first Pakistan Biosafety Rules and Guidelines in 2005 for production, import, export and storage of organisms especially living modified organisms (LMOs) (4) but these guidelines seem incomplete when applied to diagnostic and clinical facilities. To fill these gaps, Ministry of National Health Services Regulations and Coordination, Government of Pakistan released National Laboratory Biosafety and Biosecurity Policy in December 2017 (5). However, the policy doesn't address dual use dilemma relevant and applicable to research in Pakistan. The National Research Council (NRC) and the American Association for the Advancement of Science (AAAS) conducted a survey in 2007 to assess attitude of life science researchers towards dual use research. This survey addressed the paucity of data on level of awareness of dual use research among U.S. scientists to identify gaps and find effective ways to fill these gaps (6). In this study, we sought to address the attitudes and level of awareness of graduate students in Pakistan towards the issues surrounding dual use. This data was then used to the develop appropriate training and educational programs related to dual-use research of concern in Pakistan.

MATERIALS AND METHODS

With support from Health Security Partners, a cross sectional study was conducted to evaluate the level of awareness and attitudes of M. Phil (18 years of education) and PhD students (19 years and above) in life sciences disciplines towards Dual Use Research of Concern in four provinces, federal area and Azad Jammu and Kashmir region of Pakistan. A total of thirty two fifty universities were included on the basis of non-probability sampling. The total number of universities offering post graduate degrees in life sciences disciplines and the number of universities who participated in the survey are given province wise in Table 1. Institutional Review Board (IRB) approval was taken from the Dow University of Health Sciences Karachi. The survey was conducted between August 2016 and September 2017. The language of pretested, self-administered and anonymous questionnaire was English.

Characteristics	No	Yes	Yes, unsure of meaning	Number	P value (chi square)
Degree program					
Masters (M. Phil)	14.5	45.2	18.5	730	0.83
Doctoral (PhD)	4.1	13.0	4.7	203	
Province					
Punjab	11.3	34.3	11.3	530	0.01
Sindh	3.8	9.6	6.4	185	
Khyber Pakhtunkhwa	2.0	6.4	3.5	112	
Balochistan	1.3	6.5	1.7	89	
Jammu Kashmir	0.0	1.1	0.1	11	
Islamabad	0.2	0.1	0.2	5	
Other	0.0	0.1	0.0	1	
All	58.2	23.3	18.5	933	

RESULTS

Across the students targeted, 933 students responded. 769 respondents answered survey questions. Most of the respondents (58.2%) have never heard of DURC, 18.5% have heard of the term, but were unsure of its meaning. DURC awareness distribution by province is shown in Table 2.

Evaluation and reporting of research projects with dual use potential: Many students indicated that universities (60.6%) and researchers (18.3%) should consider DURC in their reviews and evaluation of research projects. Few selected the government (9.2%) and some (10%) were unsure, while one percent did not think that the evaluation was necessary. %.

Ability to identify DURC Categories: Students were evaluated for their ability to identify seven categories of experiments, which were proposed by NSABB under United States Government policy for DURC. Approximately half of the doctoral students and only a third of the master's level students were able to correctly identify all of the seven categories. Also, 46.5% of all students selected only one category of the experiments ignoring the other six, and 7.9% opted for "none of the above". There was a significant difference ($p < 0.05$) in ability to identify the categories between masters and doctoral level students (Fig 1A). In comparing ability to identify these categories based on prior awareness or knowledge of DURC, the differences across the categories were not significant other than the category of "increasing transmissibility and stability of a biological agent" ($P < 0.05$) as shown in Fig 1B.

Publishing research with dual use potential: Respondents were evaluated for their attitude towards publishing research with dual use potential. In the case of results with dual use potential, 69.1% indicated they would publish with limited protocol after de-coupling materials and methods of concern to limit reader's ability to reproduce research, with 43.5% indicating they would publish the limited protocol only if there was a way for scientists to access their data.

Communication of dual use research outside of research publication: Most of the students (95%) indicated that DURC needs to be considered when results are communicated outside of publication. Over half (58.2%) students indicated that results should be carefully communicated online (excluding publication) due to DURC issues followed by poster presentation (37.3%), oral presentation (33.9%) and an informal approach such as informal discussions among the scientists (19.1%). There was a statistically significant difference, with more doctoral students concerned about informal communication (27.1%) in comparison to masters' students (16.8%) (Figure 2)

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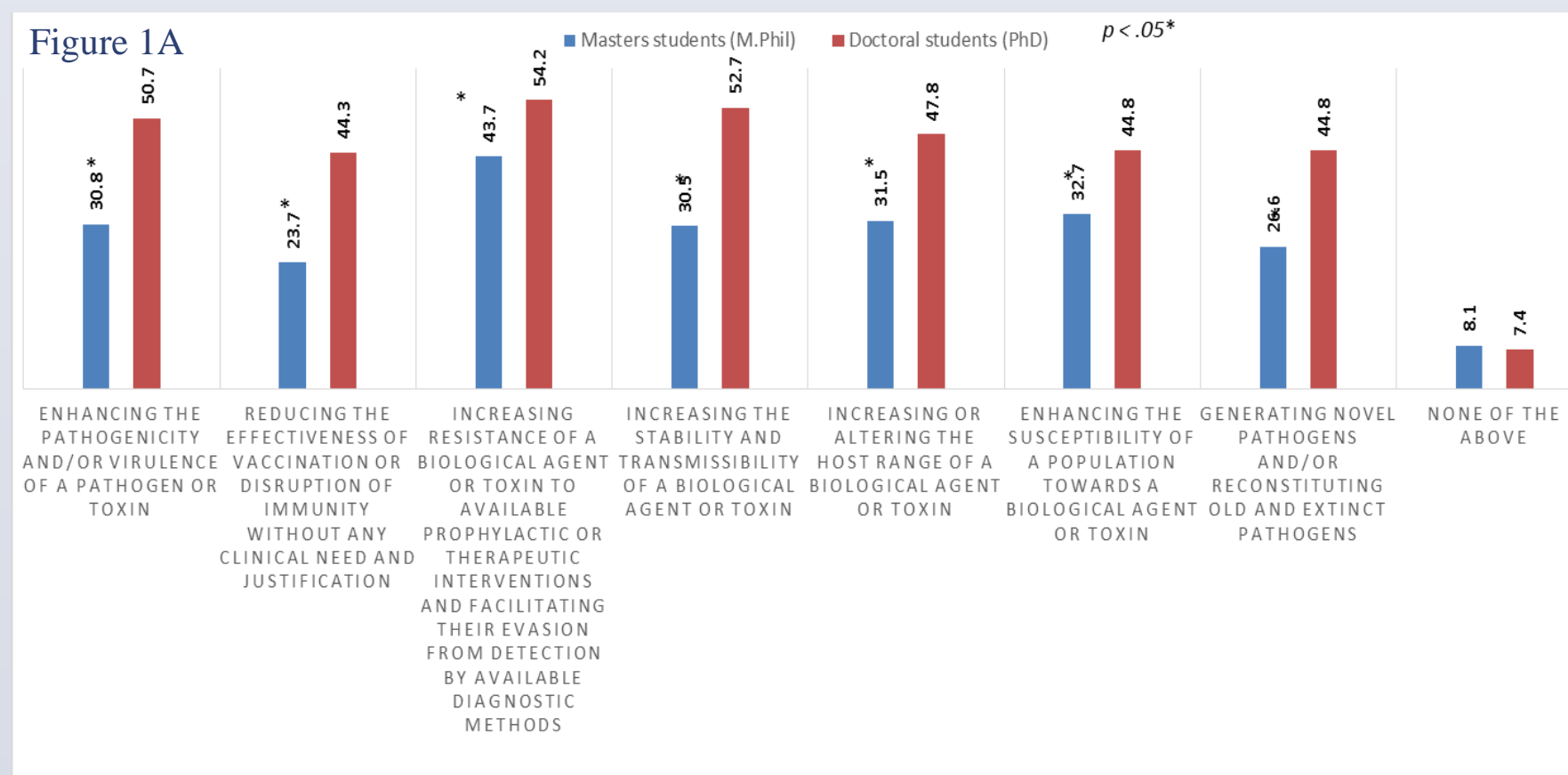
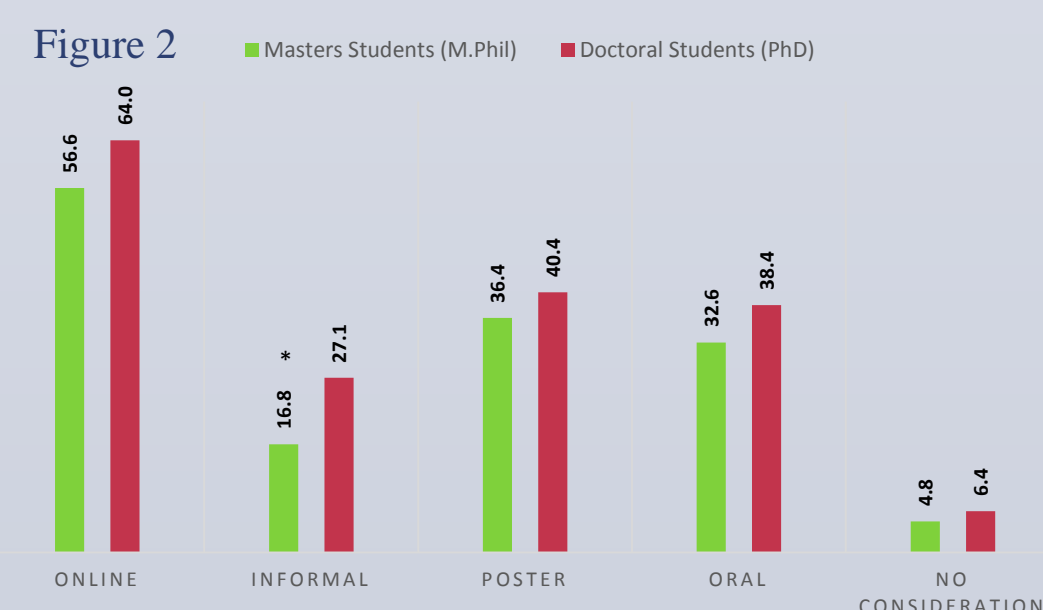


Figure 1A. Comparison of ability to identify seven categories of experiments of concern among M. Phil and PhD students

Figure 1B. Comparison of ability to identify seven categories of experiments of concern and prior DURC knowledge

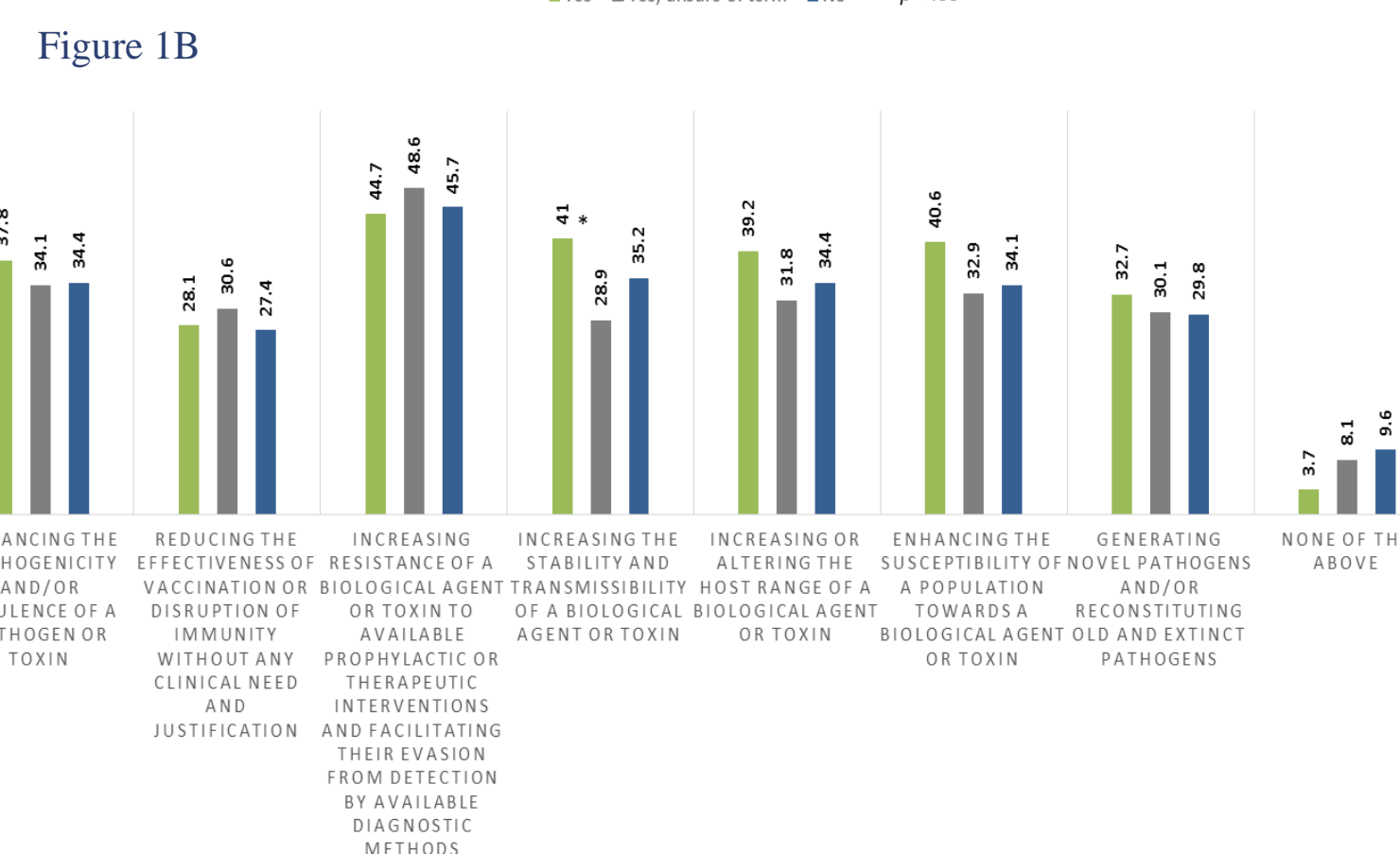


Figure 2. Comparison of responsible communication (other than research publication) among post graduate students

DISCUSSION

The findings of this study offer insight into early career scientists' understanding of and attitudes towards dual-use research. Based on a review of the literature, this study represents the first attempt to examine the beliefs of early career scientists in Pakistan. Previous studies have focused on mid-career scientists from the US (6). According to our survey results,

1. Awareness of the concept of dual-use research was limited prior to the survey, with less than half of all respondents have previously been exposed to the term.
2. A majority of Masters and PhD students agreed that students should screen their research projects for dual use potential and should first identify risks themselves.
3. The respondents were unlikely to limit publications to prevent the misuse of their research but more than half of the students agreed to publish data after de-coupling methods of concern to limit reader's ability to reproduce research.

The idea of self-governance among young and early career scientists in Pakistan can not only offer greater oversight into this matter but can also increase awareness level by making it a compulsive part of synopsis and thesis dissertations. There has been a continuous debate in the past years about publishers' and scientists' right to publish and share information. Dual use research awareness and education don't limit scientists from publication and data sharing and there is an ongoing discussion on how the risks of publishing data with high dual use potential can be mitigated. At the same time, it is very difficult to define useful and potentially harmful findings as the risks and benefits of research undertaken significantly overlap one another. Therefore, enough training at the level of students to make them understand policies and establishing solid grounds for limiting research publications by policy makers are equally necessary to keep balance.

In Pakistan, all Pakistani journals are not recognized by Pakistan Higher Education Commission (HEC). According to HEC's report published in May 2018, 14% and 21% health sciences journals were derecognized and suspended respectively in 2017 on account of serious concerns raised by HEC's quality enhancement cell (7). It is important to know and emphasize the importance of having experts in dual use research in all HEC journals. However, capacity building of these journals is a challenging task and needs to be considered seriously.

The findings of this study are encouraging and awareness and education on DURC can bring a significant change in researcher's understanding of and attitude towards DURC.

REFERENCES

1. National Institutes of Health, 2012. United States Government policy for oversight of life sciences dual use research of concern. *National Institutes of Health Office of Science Policy*.
2. National Research Council, 2004. Biotechnology research in an age of terrorism. *National Academies Press*.
3. National Institutes of Health, 2014. Tools for the Identification, Assessment, Management, and Responsible Communication of Dual Use Research of Concern: A Companion Guide to the United States Government Policies for Oversight of Life Sciences Dual Use Research of Concern. *National Institutes of Health*.
4. Government of Pakistan, 2005. Pakistan Biosafety Rules. *Government of Pakistan*.
5. Pakistan Ministry of National Health Services Regulations and Coordination, 2017. National Laboratory Biosafety and Biosecurity Policy. *Government of Pakistan*.
6. American Association for the Advancement of Science and National Research Council, 2009. A survey of attitudes and actions on dual use research in the life sciences: A collaborative effort of the National Research Council and the American Association for the Advancement of Science. *National Academies Press*.
7. Higher Education System, 2018. HEC Recognized Health Science Journals, viewed 24 September 2018, <<http://www.hec.gov.pk/english/services/faculty/journals/Documents/Sciences/Science-Journals/Health-Sciences-Journals.pdf>>

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