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Are the discoveries directed to applications? Translating the status of translational research in Peshawar, Pakistan

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ABSTRACT

Background: Translational research plays a pivotal role in transforming basic scientific discoveries into practical applications, such as drugs and treatments, to address community health needs. This study aims to assess the awareness and perceptions of translational research among healthcare professionals in Peshawar, Pakistan.

Methods: A cross-sectional descriptive design was employed, with data collected between January and July 2023 from public and private tertiary care hospitals in Peshawar, Pakistan. The study was approved by Ethical review board of Northwest School of Medicine via letter number: IRB & EC/2022-SM/074 dated: 15 Nov 2022. A sample size of 472 healthcare professionals was determined using the OpenEpi sample size calculator. The study utilized a self-structured questionnaire covering demographic information, awareness of translational research, and knowledge of its various aspects. Data analysis was performed using SPSS version 26, employing descriptive statistics and a one-sample t-test.

Results: The study included 472 participants, with a mean age of 30.8 years, comprising various healthcare roles. Gender distribution showed 62.7% males and 37.3% females. Only 25% of respondents reported familiarity with translational research, while 75% indicated a lack of awareness. Information sources varied, with conferences/seminars (16.1%) and colleagues (5.5%) being prominent. Regarding the understanding of translational research, 64.2% admitted to having no idea. Identified barriers included lack of resources (14.8%), lack of awareness (7.6%), and lack of a sense of responsibility (1.3%). A significant majority (87.3%) reported poor knowledge of translational research, while only 12.7% indicated good knowledge.

Conclusion: The findings highlight a substantial lack of awareness and understanding of translational research among healthcare professionals in Pakistan.

Keywords: Translational research, Healthcare professionals, Awareness, Peshawar, Pakistan.

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Introduction

The research originated from making observations of the world that surrounds us, sorting out the patterns, trying to come up with explanations, and in quest of that

brainstorming, experimenting, and making discoveries. The observations and experimentation in the pursuit of a quest for knowledge formed the basis of basic scientific research. A step ahead of the basic research was the application of the data into practice that evolved into the 'translational research' of the modern era, where basic research discoveries are being transformed into drugs, treatments, or preventive strategies (1).

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This research translates the desires of community health and directs toward problem-solving and therapeutic intervention development via multi-disciplinary collaboration and task-oriented experimental approaches. The spectrum of translational research is a combination of different stages from the research initiation to application (2). Pakistan is also participating in the research and development race, at a slow pace, however, the current advancements may direct us faster in the right direction. There is a requirement for training programs educating the researcher community with the translation of interdisciplinary and task-based research into practical applicability. Based on the current advances translational research is an actual indicator of the scientific development of states (3). Even though a lot of scientific research is being conducted, translational research has not gained the desired attention and significance in Pakistan. Pakistan on average has as low as 0.04% contribution to research worldwide and unfortunately, this quantity also includes low-quality insignificant work (4). Although, geographical location as well as the community requirements of the country are not only ideal but in dire need of applicable need-based translational research. The attention of the research community needs to be directed in this direction so they can construct ideas and research to develop therapeutics or management strategies that can be made available for public health and betterment.

Methods

This study employed a cross-sectional descriptive design and was conducted between January and July 2023 in various public and private tertiary care hospitals located in Peshawar, Pakistan. The targeted study population included 10,00,000 healthcare professionals, encompassing house officers, medical officers, postgraduate trainees, clinicians, dentists, and pharmacists. Utilizing the OpenEpi sample size calculator, the formula "*Sample size n = [DEFFNp(1-p)]/ [(d2/Z21-a/2(N-1) +p*(1-p)]*" was applied to achieve a desired sample size of 472. This calculation considered an anticipated prevalence of 50%, a 97% confidence level, and a 5% margin of error. The study protocol and variables underwent thorough review and approval by the Northwest School of Medicine institutional review board and ethics committee (IRB&EC/2022-SM/074) (15th November 2022). Prior to their enrolment, all participants were comprehensively informed about the study's objectives and goals, and their verbal consent was obtained. Inclusion was solely based on participant willingness, while exclusion criteria included unwillingness or incomplete questionnaire completion. Data collection utilized a self-structured questionnaire, meticulously developed through comprehensive literature review and expert

consultation. First part of the questionnaire focused on collecting demographic data, while the second part addressed the study's specific objectives. Data analysis was conducted using SPSS version 26, encompassing the calculation of means, standard deviations, frequencies, and percentages for various variables. Knowledge was categorized as either "poor" or "good", and analysis involved a one-sample t-test with a test value of 8.

Results

The study population comprised 472 individuals, with a gender distribution of 62.7% males and 37.3% females. The mean age of the participants was 30.8 years, with a standard deviation of ±11.3. In terms of professional roles, the majority were postgraduate trainees (31.1%), followed by clinicians (20.6%), house officers (15.3%), pharmacists (19.9%), medical officers (7.6%), and dentists (5.5%), (Table 1).

Table 1: Demographics of the participants

Age	**Mean:** 30.8 years	**Standard Deviation:**±11.3 years
Gender	**Frequency (n)**	**Percent (%)**
Male	296	62.7
Female	176	37.3
Total	*472*	*100.0*
Profession		
House officer	72	15.3
Medical officer	36	7.6
Post graduate trainee	147	31.1
Clinician	97	20.6
Dentist	26	5.5
Pharmacist	94	19.9
Total	472	100.0

About 25% of respondents reported familiarity with translational research, with the majority (75%) indicating lack of awareness. Among those aware, the information sources varied, with conferences/seminars (16.1%) and colleagues (5.5%) being prominent. When asked to define translational research, 9.5% associated it with translating lab results to clinical trials, while 10% mentioned activities related to drug repurposing. A significant portion (64.2%) admitted to having no idea. Regarding conductors of translational research, 73.7% claimed ignorance, while 13.1% identified all mentioned entities. Concerning institutional involvement, only 10.8% reported having a clinical trial center, and 8.7% had attended awareness sessions, primarily in conferences/seminars (48.7%). A quarter (22.5%) believed formal sessions should be conducted, primarily for junior clinicians/pharmacists (13.6%). Although 18.2% claimed to understand the purpose of translational research, information availability was limited (11.2%). Knowledge about pre-clinical trials was mixed, with 18.6% aware and 9.1% having conducted one. Understanding of clinical trials varied, with 17.6% claiming knowledge. In terms of pre-clinical trial aspects, 64.4% expressed no idea. Regarding the next steps, 14.2% knew about them, while 10.4% knew how to proceed. Views on the importance of clinical trials over pre-clinical trials were diverse, with 69.1% stating never. A small percentage (13.3%) claimed to know how to start a clinical trial, and 8.9% had received training. Knowledge about registering clinical trials was limited (8.5%). Identified barriers to translational research includes lack of resources (14.8%), lack of awareness (7.6%), and lack of a sense of responsibility (1.3%), with 65% choosing none of the above (Table 2 and 3).

Table 2: Reported frequencies of various variables regarding translational research

Variable	Yes (n) (%)	No (n) (%)	Total (n) (%)
Have you ever heard about translational research?	118 (25.0)	354 (75.0)	472 (100.0)
Does your institute have a clinical trial center?	51 (10.8)	421 (89.2)	472 (100.0)
Ever attended an awareness session/workshop on translational research?	41 (8.7)	431 (91.3)	472 (100.0)
Do you think formal sessions should be conducted to aware the health care professionals about translational research?	106 (22.5)	366 (77.5)	472 (100.0)
Do you know the purpose of translational research?	86 (18.2)	386 (81.8)	472 (100.0)
Do you know what pre-clinical trials are?	88 (18.6)	384 (81.4)	472 (100.0)
Have you ever conducted a pre-clinical trial?	43 (9.1)	429 (90.9)	472 (100.0)
Do you know about clinical trials?	83 (17.6)	389 (82.4)	472(100.0)
Do you know the next step to the pre-clinical trials?	67 (14.2)	405 (85.8)	472 (100.0)
Do you know how to proceed to the next step after pre-clinical trials?	49 (10.4)	423 (89.6)	472 (100.0)
Do you know how to start a clinical trial?	63 (13.3)	409 (86.7)	472 (100.0)
Have you ever taken a training regarding the clinical trials?	42 (8.9)	430 (91.1)	472 (100.0)
Do you know where the information on translational research is available?	53 (11.2)	419 (88.8)	472 (100.0)
Do you know how to register a clinical trial?	40 (8.5)	432 (91.5)	472 (100.0)
Do you think clinical trials are more important than pre-clinical trials?	126 (26.7)	346 (73.3)	472 (100.0)

Table 3 summarizes the participants responses related to the source of information, understanding, and perceived barriers regarding translational research.

Table 3: Responses regarding source of information, understanding, and perceived barriers of translational research

Variable	Frequency (n) (%)
You got the information regarding translational research from?	
College or hospital	37 (7.8)
Conference or seminar	76 (16.1)
Internet	27 (5.7)
Colleagues	26 (5.5)
I have no definite information	307 (65.0)
Total	***472 (100.00)***
According to your understanding, translational research is?	
Translating results taken from the lab research to the clinical trials	45 (9.5)
Translating results in the clinical trials and taking it to the lab research	26 (5.5)
Translation of ethical protocols to be followed during clinical trials	37 (7.8)
Translation of the drug passing through pharmacovigilance to human	14 (3.0)
Activities relating to the repurposing of the drugs to their off label uses.	47 (10.0)
I have no idea	303 (64.2)
Total	***472 (100.0)***
Translational research is conducted by?	
International organizations	25 (5.3)
National organizations	20 (4.2)
Individual institutions	17 (3.6)
All of these	62 (13.1)
No idea	348 (73.7)

Total	***472 (100.0)***
Most important aspect of a pre-clinical trial, in your opinion?	
Efficacy	15 (3.2)
Toxicity	54 (11.4)
Safety	39 (8.3)
All of them	60 (12.7)
No idea	304 (64.4)
Total	*472 (100.0)*
What in your opinion is the major barrier in translational research application in Pakistan?	
Lack of awareness	36 (7.6)
Lack of resources	70 (14.8)
Lack of sense of responsibility	6 (1.3)
It is not much important	1 (0.2)
All of the above	52 (11.0)
None of the above	307 (65.0)
Total	472 (100.0)

A significant majority of respondents (87.3%) reported poor knowledge, while a minority (12.7%) indicated good knowledge on the subject under investigation. This distribution highlights a predominant lack of awareness or understanding among the surveyed population regarding the specific topic covered in the questionnaire. (Table 4)

Table 4: Knowledge of participants regarding translational research

Knowledge	Frequency (n)	Percent (%)
Poor knowledge	412	87.3
Good knowledge	60	12.7
Total	472	100.0

Table 5 outlines the results of a one-sample t-test with a test value of 8 across various variables related to knowledge and perceptions of translational research. The mean, standard deviation, t-value, and p-value for each variable are provided. In all cases, the p-values are extremely low (0.000), indicating a highly significant difference between the sample mean and the test value. The negative T-values suggest that the sample means for these variables are significantly below the test value of 8. This implies that participants, on average, scored much lower than the specified test value across all the surveyed aspects related to translational research knowledge and perceptions. The findings suggest a substantial deficit in understanding or awareness among the respondents regarding the topic under study.

Table 5: One-Sample t-test table of various variables with a test value of 8

Variable	Mean	Std. Deviation	T-value	P-Value
According to your understanding, translational research is?	0.10	0.294	*-584.138*	*0.000*
Translational research is conducted by?	0.13	0.338	*-505.551*	*0.000*
Do you think formal sessions should be conducted to aware the health care professionals about translational research?	0.22	0.418	*-404.374*	*0.000*
Do you know the purpose of translational research?	0.18	0.386	*-439.535*	*0.000*
The information on translational research is?	0.11	0.316	*-542.199*	*0.000*
Do you know what are pre-clinical trials?	0.19	0.390	*-435.406*	*0.000*
Do you know about clinical trials?	0.17	0.379	*-448.299*	*0.000*
Most important aspect of a pre-clinical trial, in your opinion?	0.13	0.333	*-512.935*	*0.000*

Do you know the next step to the pre-clinical trials?	0.14	0.349	*-488.655*	*0.000*
Do you know how to proceed to the next step after pre-clinical trials?	0.10	0.305	*-561.826*	*0.000*
Do you think clinical trials are more important than pre-clinical trials?	0.69	0.463	*-343.198*	*0.000*
Do you know how to start a clinical trial?	0.13	0.340	*-502.000*	*0.000*
Do you know how to register a clinical trial?	0.08	0.279	*-616.802*	*0.000*

Discussion

In this study only 9.53% of the participants could correctly answer what the translational research was and 73.72% were unaware as to where this research is conducted. When the "needs of translational research were only beginning to emerge," Morgan et al. interviewed fundamental and clinical scientists in 2008. Both kinds of scientists stated that they were aware of the idea and the present focus on it in policy, explaining they referred to it as the "mantra of the moment", but they had no idea what it meant and could only provide a vague explanation, like "to try to move stuff from the lab to the clinic" (6). Translational research is predicated on the idea that studies on animals will eventually lead to studies on humans. However, according to a UK-based study, basic scientists found that because animals were readily available, experimentation on them was preferred and more likely to produce publication-quality results (7). By contrast, studies involving donated human cells were thought to be more output-risky because of the challenges associated with collecting samples from patients (8). Total 81.35% and 86.65% of the participants in the current study did not know about the pre-clinical and clinical trials and how to proceed with them. It identifies one of the major barriers in the deficiency of translational research among healthcare workers in this area. Most of them understand the significance of the research but are unable to proceed with it because of barriers such as lack of knowledge among others. Similarly in a study conducted in a tertiary care hospital in Saudi Arabia, the participants' awareness of the clinical trials (CTs) was found to be inadequate, and 9.6% of them said they didn't think doing CTs would be beneficial. The majority of respondents indicated that they would be eager to help and facilitate CTs, and they had a good attitude regarding adopting and implementing CTs (9). Participants' perceptions in CTs were shown to be inconsistent, and this could have something to do with the value and beneficence of involvement. This shouldn't go against the ideas of carrying out top-notch clinical research and maintaining Good Clinical Practice guidelines to increase involvement (10). It has also been discovered that recruitment problems are a barrier, frequently leading to the early termination of CTs. Additional research is required to evaluate these obstacles and identify potential solutions on multiple fronts (11, 12). Healthcare workers who understand the importance of translational medicine and have some awareness of it are more likely to respond positively to the practice; others who have negative attitudes toward it are less likely to do so. Effective steps are required to raise translational medicine's profile in China. Additional studies have demonstrated the critical role that clinician-scientists play in translational research and have pinpointed obstacles to career advancement (13). Given these concerns, efforts to raise awareness and

provide education and training on translational medicine should be directed toward all members of the medical community, from community physicians to top scientists. Multilevel programs, such as degree and certificate programs, are also required, as well as courses, to give health professionals the skills they need to perform clinical and translational research (14, 15). This lag in the research is an outcome of many factors. The financial condition does have a significant role in the discouragement and hesitation to initiate meaningful and applicable projects (5), however in our point of view more important is the lack of knowledge, awareness, guidance, and ignorance of the level of significance of translational research.

Study Strengths and Limitations

This pioneering study in Pakistan assesses healthcare workers' attitudes and understanding of translational medicine. It underscores the need for awareness and strategies to promote translational research. Limitations include potential over or understatement of participant views, a focus on attitudes rather than practice, and a lack of investigation into barriers to knowledge. Future research should delve into practical application and barriers to fully understand translational medicine's impact.

Conclusion

Translational research awareness is low; 75% lack familiarity. Only 25% report some understanding. Sources like conferences and colleagues contribute to knowledge. However, uncertainty persists regarding definitions, conductors, and procedural aspects. Statistical analysis confirms a significant knowledge deficit.

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References

1. Woolf SH. The meaning of translational research and why it matters. JAMA. 2008 Jan 9; 299(2):211-3. doi: 10.1001/jama.2007.26.
2. Hörig H, Marincola E, Marincola FM. Obstacles and opportunities in translational research. Nat Med. 2005 Jul; 11(7):705-8.
3. Trochim W, Kane C, Graham MJ, Pincus HA. Evaluating translational research: a process marker model. Clin Transl Sci. 2011 Jun; 4(3):153-62.
4. Ahmed M. Enough quantity: time to focus on quality of researchers in Pakistan. Int High Educ. 2017 Sep 2(91):24-5.
5. Leask M, Jumani NB. MESH Pakistan: prospects and challenges. J Educ Teach. 2015 Oct 20; 41(5):586-96.
6. Morgan M, Barry CA, Donovan JL, Sandall J, Wolfe CDA, Boaz A. Implementing 'translational' biomedical research: convergence and divergence among clinical and basic scientists. Soc Sci Med. 2011; 73(7):945-52.
7. Chen H. Stem cell governance in China: from bench to bedside? New Genet Soc. 2009; 28(3):267-82.
8. Wainwright SP, Williams C, Michael M, Farsides B, Cribb A. From bench to bedside? Biomedical scientists' expectations of stem cell science as a future therapy for diabetes. Soc Sci Med. 2006; 63(8):2052-64.
9. Gupta SK, Nayak RP, Shivaranjani R, Vidyarthi SK. A questionnaire study on the knowledge, attitude, and the practice of pharmacovigilance among the healthcare professionals in a teaching

hospital in South India. Perspect Clin Res. 2015 Jan; 6(1):45.
10. González-Saldivar G, Rodríguez-Gutiérrez R, Viramontes-Madrid JL, Salcido-Montenegro A, Carlos-Reyna KE, Treviño-Alvarez AM, et al. Participants' perception of pharmaceutical clinical research: a cross-sectional controlled study. Patient Prefer Adherence. 2016; 10:727-34.
11. Durant RW, Wenzel JA, Scarinci IC, Paterniti DA, Fouad MN, Hurd TC, et al. Perspectives on barriers and facilitators to minority recruitment for clinical trials among cancer center leaders, investigators, research staff, and referring clinicians: enhancing minority participation in clinical trials (EMPaCT). Cancer. 2014; 120 Suppl 7:1097-105. doi: 10.1002/cncr.28574
12. Wang JH, Sheppard VB, Liang W, Ma GX, Maxwell AE. Recruiting Chinese Americans into cancer screening intervention trials: strategies and outcomes. Clin Trials. 2014; 11:167-77. doi: 10.1177/1740774513518849.
13. Lander B, Hanley GE, Atkinson-Grosjean J. Clinician-scientists in Canada: barriers to career entry and progress. PLoS One. 2010 Oct 4; 5(10):e13168. doi: 10.1371/journal.pone.0013168.
14. Comeau DL, Escoffery C, Freedman A, et al. Improving clinical and translational research training: a qualitative evaluation of the Atlanta Clinical and Translational Science Institute KL2-mentored research scholars program. J Investig Med. 2017 Jan; 65(1):23-31. doi: 10.1136/jim-2016-000143.
15. Petrelli A, Prakken BJ, Rosenblum ND, et al. Developing translational medicine professionals: the Marie Sklodowska-Curie action model. J Investig Med. 2017 Jan; 65(1):23-31. doi: 10.1136/jim-2016-000143.

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