ORIGINAL ARTICLE

www.ijrdh.com
ISSN: 2321 - 1431

COMMUNITY MEDICINE

Research methodology workshop for interns: Useful in increasing knowledge of biomedical research?

Liaquat Roopesh Johnson*, Karunakaran Usha Devi

ABSTRACT

Background: The Medical Council of India has laid out a roadmap for undergraduate medical education in India in its Vision 2015 document. It envisions the creation of an Indian Medical Graduate, who will have all-round competence. The Tamil Nadu Dr. MGR Medical University took the lead and introduced research methodology workshops for medical interns in 2011.

Aims and Objectives: This study evaluates the usefulness of such a workshop in enhancing knowledge of biomedical research.

Materials and Methods: The study was conducted in February 2012, in a private medical college affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai. After obtaining verbal consent, interns were administered a pretest questionnaire. Following the conclusion of the workshop, posttest questionnaire was administered.

Conclusion: There was a statistically significant improvement in the posttest knowledge score. The study demonstrates that it is possible to increase knowledge of biomedical research among interns through a short research methodology workshop.

Key words: ***biomedical research, knowledge, medical interns, research methodology, workshop***

Introduction

The Medical Council of India envisions that undergraduate medical students will be able to formulate a research question and "be familiar with basic, clinical and translational research as it applies to the care of the patient" [1]. Towards that end, The Tamil Nadu Dr. MGR Medical University, Chennai has resolved that all affiliated medical colleges must conduct (one day) Research Methodology Workshops for those undergoing Compulsory Residential Rotatory Internship (CRRI) [2]. The Department of Community Medicine in each medical college is required to organize these workshops for each batch of interns [2].

Over time, questions regarding the usefulness of conducting research methodology workshops for interns have been raised. There is a concern that such programs are attended only because they are mandatory; not due to interest in research per se.

The present study was conducted to ascertain whether there is an improvement in basic knowledge of biomedical research among medical interns following a Research Methodology Workshop.

Materials and Methods

The study was conducted in Sree Mookambika Institute of Medical Sciences, a private medical college affiliated to The Tamil Nadu Dr. MGR Medical University, Chennai, on 21st February, 2012. Permission to conduct the study was obtained from the Director and Principal of the college. Prior verbal consent was obtained from all the participants. A pre-tested, structured, self-administered questionnaire was used to assess knowledge before and after the Research Methodology Workshop. In order to maintain anonymity, each participating intern was randomly assigned an alpha-numeric code before the administration of the pretest. They were instructed to use the same code while answering the posttest. The questionnaire consisted of 10 questions, each assessing knowledge of a basic concept in research. Of the 120 interns present for the workshop, 105 participated in the study. The participants were given 10 minutes to return the filled in questionnaire

on each occasion. Data entry was done using Microsoft Office Excel 2007. The data was analyzed using EZR on R Commander (version 1.8-4). Wilcoxon Signed Rank Test and McNemar's Chi-square test were used to test for statistical significance. A p value of ≤0.05 was considered statistically significant.

Results

The mean (SD) age of respondents was 22.6 (0.9)years. All correct responses were awarded 3 marks, while incorrect responses were awarded 2 marks. Those who selected "don't know" were awarded 1 mark. The scores obtained for each question were added to obtain the total Pre Test and Post Test scores, respectively. The mean pretest and posttest scores for each question are shown in Figure 1.

The mean Pre Test score was 24.87, while the mean Post Test score was 26.93. The responses for each question were grouped according to timing (pretest/ posttest) and score (3; and less than 3). The frequency distribution of responses for each question is shown in Table 1 and Table 2.

Wilcoxon signed rank test was used as the initial test for statistical significance between the pretest and posttest scores. The reason for this was the fact that the test merely determines if the median difference at 5% significance level is greater than zero. It does not indicate the direction of difference, and therefore, only yields partial information. The results of the test are presented in Table 3.

Next, the data were recoded to create dichotomous variables for each question, with the two levels representing scores of 3 (correct response) and less than 3 (incorrect response, don't know).

Thus, ten pairs of dichotomous variables were generated. McNemar's Chi-squared test was used to test for statistical significance between the pretest and posttest scores in each pair (Table 4).

Although the McNemar's Chi-squared test yielded many statistically significant values, it is important to exercise caution in interpreting the results. The reason for this is the framework of the McNemar's Chi-squared test itself (Table 5).

As can be seen from the table, the pairs are 1. <3; and 2. 3 (pretest and posttest) respectively. What the test actually tells us is whether the proportion of those who had a certain score in the pretest is significantly different in the posttest. However, what we are interested in is the proportion of subjects who had a low score in the pretest, but scored high in the posttest. Thus, we need to determine the percentage of change between the two tests. Specifically, we need to know whether the change was positive or negative; and the magnitude of change. The positive change (%) is given by: [b/(a+b)] *100

This tells us the proportion of subjects who demonstrated an improvement in the posttest. In some cases, the negative change may be high, indicating guesswork. Negative change (%) is given by: [c/(c+d)]*100. Details of change (%) are given in Table 6.

It is clear that students guessed the answers to question four (how to cite references of a journal article); and seven (case vignette on conclusions of a study). In addition, some guesswork seems to have been employed in answering question three (determination of study design); and ten (choosing statistical tests for analysis). In all these cases, the negative change is in excess of 20%(Table 6). It is evident that there was a greater positive change in scores between the pretest and posttest for most questions.

Discussion

The Tamil Nadu Dr. MGR Medical University was the first medical university to introduce research methodology workshop for medical interns. The intended purpose was to promote knowledge of biomedical research among them. One among a series of mandatory workshops for CRRIs, many faculty members were skeptical that it would not help improve knowledge of biomedical research among the CRRIs. The results indicate that there was a statistically significant improvement in knowledge between the pretest and the posttest. The workshop deliberately focused on only the most essential topics pertaining to biomedical research, and restricted itself to a few points in each topic. Therefore, it is not surprising that the average pretest score was 24 out of 30 (80%). One factor could have been that 36 subjects had already completed their community medicine posting, and had obtained first-hand research experience.

From the results a few important inferences can be drawn. The first is with regard to the topics that showed the most significant difference in performance. The second concerns the type of question itself. The questions that showed the most dramatic difference in scores pertained to sample size calculation, study design, meaning of p value, literature review, and correct order of headings in an article.

The question pertaining to study design asked what influenced the study design-research question; sample size; investigator's preference; or is independent of the above considerations.

Figure: 1. Distribution of scores

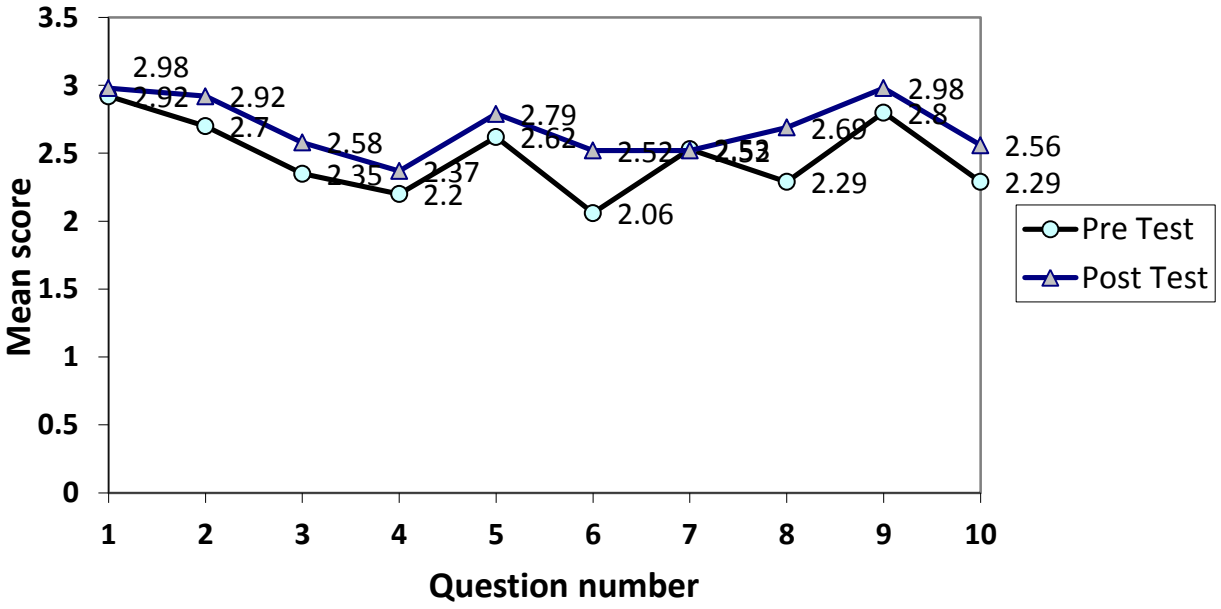

Table: 1. Frequency distribution of responses by item (Pretest)

Sl.no	Item	Response		
		Correct n(%)	Incorrect n(%)	Don't know* n(%)
1.	Research sequence	99(94.3%)	4(3.8%)	2(1.9%)
2.	Sample size calculation	80(76.2%)	25(23.8%)	
3.	Study design	37(35.2%)	68(64.8%)	
4.	References of a journal article	24(22.9%)	80(76.2%)	1(0.9%)
5.	Good research topic	66(62.9%)	39(37.2%)	
6.	Meaning of p value of 0.05	37(35.2%)	38(36.2%)	30(28.6%)
7.	Conclusions of study (vignette)	64(61%)	33(31.4%)	8(7.6%)
8.	Literature review	54(51.4%)	28(26.7%)	23(21.9%)
9.	Correct order of headings in article	84(80%)	21(20%)	
10.	Choosing statistical tests for analysis	41(39.1%)	54(51.4%)	10(9.5%)

*All questions did not have this option (Don't know)

The meaning of the p value is a difficult concept to grasp immediately. Subjects were required to indicate what a p value of 0.05 means. Of the four options provided, two were diametrically opposite. One stated that there is a 95% possibility that the findings occurred merely by chance; while the other stated the opposite. The other two options were: "It is statistically significant but I don't know why"; and "Don't know/ unsure". One would expect respondents to guess between the first two options. However, this is not borne out by the values in Table 6.

Table: 2. Frequency distribution of responses by item (Posttest)

Sl. No.	Item	Response		
		Correct n(%)	Incorrect n(%)	Don't know n(%)
1.	Research sequence	104(99.1%)		1(0.9%)
2.	Sample size calculation	97(92.4%)	8(7.6%)	
3.	Study design	61(58.1%)	44(41.9%)	
4.	References of a journal article	39(37.1%)	66(62.9%)	
5.	Good research topic	83(79%)	22(21%)	
6.	Meaning of p value of 0.05	61(58.1%)	38(36.2%)	6(5.7%)
7.	Conclusions of study (vignette)	56(53.3%)	48(45.7%)	1(0.9%)
8.	Literature review	78(74.3%)	22(21%)	5(4.7%)
9.	Correct order of headings in article	103(98.1%)	2(1.9%)	
10.	Choosing statistical tests for analysis	60(57.1%)	44(41.9%)	1(0.9%)

Table: 3. Results of significance testing with Wilcoxon signed rank test (with continuity correction)[*]

Item	Description	V value	p value
Q1.	Research sequence	6	0.19
Q2.	Sample size calculation	36	**0.0004[†]**
Q3.	Study design	193.5	**0.0002**
Q4.	References of a journal article	234	**0.013**
Q5.	Good research topic	70	**0.001**
Q6.	Meaning of p value of 0.05	58	**<0.0001**
Q7.	Conclusions of study (vignette)	270	0.90
Q8.	Literature review	192	**<0.0001**
Q9.	Correct order of headings in article	11	**<0.0001**
Q10.	Choosing statistical tests for analysis	234	**0.0005**
Overall score		216	**<0.0001**

[*]The test was performed on the pretest, posttest pair for each item.

[†]Statistically significant values are indicated by bold type

Respondents were required to indicate whether the literature review could be performed after the completion of the study; influenced the study design but not the sample size; or influenced the study design, sample size and the discussion. The last option for this question was "Don't know/ unsure".

The correct order of headings in a journal article is fairly straightforward, provided one has read a number of articles in the past. This cannot be held true of most interns.

Interestingly, while one would normally expect participants to recollect only four or five concepts at the end of such a session, the subjects recalled seven to eight concepts. This may be due to adherence to the principles of health education.

Nevertheless, most of the questions assessed only knowledge (simple recall), which is the lowest level in the cognitive domain. The sole question requiring comprehension and application of knowledge (question seven) saw a lot of guesswork.

It is difficult to compare our findings with those of other investigators because research methodology workshops

Table: 4. Details of significance testing using McNemar's Chi-squared Test (N=105)

Item	Pre-Test score (N=105)		Post-Test score (N=105)		McNemar's X^2 value	P
	<3 n(%)	3 n(%)	<3 n(%)	3 n(%)		
Q1.	6 (5.71%)	99 (94.29%)	1 (0.95%)	3 (99.05%)	2.28	0.13
Q2.	25 (23.81%)	80 (76.19%)	8 (7.62%)	97 (92.38%)	11.113	**0.0008**
Q3.	68 (64.76%)	37 (35.24%)	44 (41.9%)	61 (58.1%)	12.59	**0.0003**
Q4.	81 (77.14%)	24 (22.86%)	66 (62.86%)	39 (37.14%)	5.02	**0.02**
Q5.	39 (37.14%)	66 (62.86%)	22 (20.95%)	83 (79.05%)	9.48	**0.0020**
Q6.	68 (64.76%)	37 (35.24%)	44 (41.9%)	61 (58.1%)	16.53	**<0.0001**
Q7.	41 (39.05%)	64 (60.95%)	49 (46.67%)	56 (53.33%)	1.75	0.18
Q8.	51 (48.57%)	54 (51.43%)	27 (25.71%)	78 (74.29%)	13.22	**0.0002**
Q9.	21 (20%)	84 (80%)	2 (1.9%)	103 (98.1%)	15.42	**<0.0001**
Q10.	64 (60.95%)	41 (39.05%)	45 (42.86%)	60 (57.14%)	7.53	**0.0060**
Overall (out of 30)	≤24 41(39.05%)	>24 64(60.95%)	≤24 4(3.81%)	>24 101(96.2%)	31.60	**<0.0001**

Table: 5. Framework of the McNemar's Chi-squared Test

		Posttest		
		1. <3	2. 3	Total
Pretest	1. <3	a	b	a+b
	2. 3	c	d	c+d
	Total	a+c	b+d	a+b+c+d

are common at the postgraduate level, but relatively uncommon at the undergraduate level in India. In addition, such workshops may not formally evaluate knowledge gain [3]. Moreover, the questions asked of postgraduate students are of a different level and nature.

It is common to engage interns in population-based research projects to develop research aptitude [4,5]. However, interns are often preoccupied with preparation for competitive examinations, and may not participate whole-heartedly in population-based research projects [4].

Therefore, the findings of this study are particularly important, as it demonstrates that knowledge about research can be effectively transferred by means of a short workshop. Although it is likely that this new-found knowledge may be temporarily lost in the pursuit of a postgraduate qualification, it may well serve as a starting point for future research.

Table: 6. Percentage change by question

Item	Change (%)	
	Positive (Desirable) [x/y(%)]	Negative (Undesirable) [x/y(%)]
Q1. Research sequence	**6/6(100%)***	1/99(1%)
Q2. Sample size calculation	**20/25(80%)**	3/80(3.7%)
Q3. Study design	**33/68(48.5%)**	9/37(24.3%)
Q4. References of a journal article	27/81(33.3%)	**12/24(50%)**
Q5. Good research topic	**22/39(56.4%)**	5/66(7.5%)
Q6. Meaning of p value of 0.05	**28/68(41.1%)**	4/37(10.8%)
Q7. Conclusions of study (vignette)	10/41(24.3%)	**18/64(28%)**
Q8. Literature review	**32/51(62.7%)**	8/54(14.8%)
Q9. Correct order of headings in article	**20/21(95.2%)**	1/84(1.1%)
Q10. Choosing statistical tests for analysis	**31/64(48.4%)**	12/41(29.2%)
Overall Score	**39/41(95.1%)**	2/64(3.1%)

*The bold type indicates which change (positive or negative) was greatest for each item.

Conclusion

There was a significant improvement in knowledge score between pretest and posttest. Questions requiring simple recall of facts showed the greatest improvement in scores between pretest and posttest. It is possible to improve knowledge about biomedical research among interns through a short Research Methodology workshop.

Acknowledgement

We would like to thank the management of the institution and all participants.

References

1. Medical Council of India. Vision 2015. Vision document. New Delhi:; 2011
2. The Tamil Nadu Dr.MGR Medical University, Chennai. Growth & Development under the leadership of the Vice Chancellor since December 2009. Chennai:; 2012.
3. Kulkarni HS. Second joint ICMR – CRI Indo-US workshop on research methodology: A Student's perspective. J Postgrad Med. 2006;52(1):p.68.
4. Chaturvedi S, Aggarwal OP. Training interns in population – based research: learners' feedback from 13 consecutive batches from a medical school in India. Med Educ. 2001 Jun; 35(6): p. 585-9.
5. Devi V, Abraham RR, Adiga A, Ramnarayan K, Kamath A. Fostering research skills in undergraduate medical students through mentored student projects: example from an Indian Medical School. Khatmandu Univ Med J. 2010 Jul-Sep; 8(31): p.294-8.

AUTHOR(S):

1. Dr.Liaquat Roopesh Johnson, Assistant Professor, Dept. of Community Medicine, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari – 629161, Tamil Nadu
2. Dr.Karunakaran Usha Devi, Professor & Head, Dept. of Community Medicine, Sree Mookambika Institute of Medical Sciences, Kulasekharam, Kanyakumari – 629161, Tamil Nadu

CORRESPONDING AUTHOR:
Dr.Liaquat Roopesh Johnson, MD
Assistant Professor,
Department of Community Medicine,
Sree Mookambika Institute of Medical Sciences,
Kulasekharam,
Kanyakumari – 629161
Tamil Nadu
Email: liaquat99@gmail.com

Conflict of Interest: None