eISSN 2076-6327

IJMS

International Journal of Medical Students

Year 2014 | Volume 2 | Issue 1

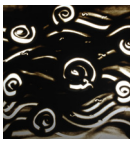
www.ijms.info

IJMS

INTERNATIONAL JOURNAL *of* MEDICAL STUDENTS

International Journal of Medical Students

The *International Journal of Medical Students* (IJMS) is a peer-reviewed open-access journal, created to share the scientific production and experiences of medical students worldwide.



Schisto SXie2

Sand Art. Scene from "Neglected: A Story of Schistosomiasis Infection in Ghana"
By Shelly Xie (with authorization).

1st Year Medical Student, University of Texas Southwestern Medical Center, Dallas, TX, USA
Email: shelly.xie@utsouthwestern.edu

International Journal of Medical Students
Year 2014 - Volume 2 - Issue 1

EDITORIAL STAFF

EDITORIAL BOARD

Support Committee of Public Relations and Communications

Ancillary Positions

Partners

AIMS Meeting
Annual International Medical Students Meeting, Portugal

ASCEMCOL
Colombian Association of Medical Student Scientific Societies, Colombia

BMSRI, Konference'12
Bio-Medical Students' Research Initiatives, India

COMAPI
Academic Medical Congress of Piaui, Brazil

GYMU
Georgian Young Medics' Union, Georgia

ISMCK
International Student Medical Congress in Košice, Slovak Republic

YES Meeting
Young European Scientist Meeting, Portugal

IJMS

International Journal *of* Medical Students

The *International Journal of Medical Students* (IJMS) is a peer-reviewed, open-access journal created to share the scientific production and experiences of medical students worldwide. Our objective is to be the primary diffusion platform for medical students, using standards that follow the process of scientific publication.

The Journal recieves contributions of previously unpublished Original Articles, Short Communications, Reviews, Case Reports, Interviews, Experiences and Letters, which are reviewed by experts (Peer-Reviewers) who have previously published similar research. This supports the quality and validity of the manuscripts. The review time delay in most cases has been two to four months depending on the diligence of peer-reviewers and authors.

The Journal and the *Editorial Board* are not responsible for the opinions expressed by the Authors of all published material, nor do these represent the official policy or medical opinion of the Journal or the institutions with which they are affiliated, unless otherwise stated.

The *International Journal of Medical Students* is published triannually on behalf of the *Executive Committee of the International Journal of Medical Students*. Any publication, dissemination or distribution of the information included in the Journal is permitted only if the source is cited (*Int J Med Students*).

The *International Journal of Medical Students* is indexed or abstracted in: Academic keys, Biblioteca Virtual del Sistema Sanitario Publico de Andalucia (BV-SSPA), Dialnet Foundation (Dialnet), Directory of Open Access Journals (DOAJ), Directory of Research Journals Indexing, Elektronische Zeitschriften-bibliothek (EZB), e-Revistas, Geneva Foundation for Medical Education and Research, Google Scholar, PubsHub Journals & Congresses, Index Copernicus (ICV 2012: 5.62), Journal Seek Database, List of Publications that follow the International Committee of Medical Journal Editors (ICMJE), Mexican Index of Latin American Biomedical Journals (IMBIOMED), Online Computer Library Center (OCLC) WorldCat, Research Bible, Rubriq, SHERPA/RoMEO, The e-Journal Gateway (J Gate), The Open Access Digital Library and Ulrich's International Periodical Directory/Summon by Serial Solutions.

All full-text articles are available at:

www.ijms.info

e-ISSN 2076-6327 (Online)

Printed in Rochester, MN, USA.

International Journal of Medical Students

Year 2014 • Volume 2 • Issue 1

Int J Med Students 2014;2(1)

Table of Contents

IJMS International Journal of Medical Students

Transparency in the International Journal of Medical Students

Francisco J. Bonilla-Escobar,[1] Aisha K. Gharaibeh,[2] Stuart J. Mires,[3] Hulegar A. Abhishek.[4]

"Science isn't about authority or white coats; it's about following a method. That method is built on core principles: precision and transparency; being clear about your methods; being honest about your results; and drawing a clear line between the results, on the one hand, and your judgment calls about how those results support a hypothesis."

www.equator-network.org

Ben Goldacre.

Noted emerging trends in the medical publication world, transparency and best practice in scholarly publishing have recently gained special emphasis. Publication ethics has rapidly grown, especially in medicine, and the need for transparent reporting of research studies is being demanded. Through withholding negative results or falsifying data we endanger not only the reputation of a field, but the evidence base for life-changing decisions that will ultimately affect patients and the health of individuals and society.

Within the scientific community, research results – both negative and positive – will influence evidence for decision making. In Journals, a lack of legitimate internal editorial process and transparency can lead to publication bias. Systematic reviews on publication bias have clearly demonstrated that studies estimated to have publication bias had higher chance of acceptance and were published in higher impact journals.[1]

The International Journal of Medical Students (IJMS) essentially adheres to a transparent editorial process. For example, the guidelines for authors adopted by the IJMS were developed based on the recommendations and guidelines of well-known bodies for medical journal editors, such as the International Committee of Medical Journal Editors (ICMJE), the Committee on Publication Ethics (COPE) and Statements such as the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) [http://www.strobe-statement.org], AGREE (The Appraisal of Guidelines for Research and Evaluation) [http://www.agreetrust.org/resource-centre/practice-guidelines/], CONSORT (CONsolidated Standards of Reporting Trials) [http://www.consort-statement.org/consort-statement/], PRISMA (Transparent Reporting of Systemic Reviews and Meta-Analyses) [http://www.prisma-statement.org/] and STARD (STAndards for the Reporting of Diagnostic accuracy studies) [http://www.stard-statement.org/].

Further, the IJMS has improved the submission system and currently applied the Open Journal System (OJS) platform. The OJS is a validated and well-known platform for journal management, submissions and editorial processing developed by the Public Knowledge Project (http://pkp.sfu.ca/ojs/ [Access: 01 29 2014]). It promotes and improves open access research. With this system now in place, IJMS authors and readers will find an easy and step by step process to submit their manuscripts and will have an improved experience throughout the editorial process. Furthermore, as the OJS is a worldwide platform, authors will gain experience in a submission process common in publishing and beneficial to their future careers.

The IJMS has recently required a transparency statement for its authors along with the other requirements. These requirements are: (1) a Cover letter: which should state mainly the novelty, interest and relevance of the work; (2) the Declaration of Conflict of Interest: which should report to the editors and readers any conflicts of interest related to the study; (3) The IJMS Author's Signature Form: in which each author agrees on points required by the IJMS to ensure the integrity of the work produced and state the contributions of each author, provided with the signature and identification card for each author; (4) Template for manuscripts: which outlines the layout of each manuscript type; and (5) Informed consent form for case reports: to avoid any ethical violation for the patient whose case was reported.

The transparency statement that is included for IJMS authors is the following:
The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.[2]

The inclusion of a transparency statement to be signed or accepted by authors is considered an important recent trend for scientific journals. The COPE, the Directory of Open Access Journals (DOAJ), the Open Access Scholarly Publishers Association (OASPA), and the World Association of Medical Editors (WAME) have collaborated to develop the Principles of Transparency and Best Practice in Scholarly Publishing to differentiate non-legitimate from legitimate publishers. The IJMS fully embraces these principles through the following:
1- Peer review process: for original articles, short communications, reviews and case reports article types; 2- Governing Body and, 3-Editorial team/contact information: the Editorial Board structure along with the ancillary jobs names with their contact information are clearly identified on the IJMS website; 4- Author fees: it is clearly stated that the IJMS does not request any kind of fees; 5- Copyright and licensing information are clearly described on the website; 6- Identification of and dealing with allegations of research misconduct: the IJMS guidelines for authors draws attention to the avoidance of research misconduct, the editors and reviewers of IJMS are required to identify any

[1] Editor in Chief IJMS. Cisalva Institute, University of Valle, Cali, Colombia.
[2] Scientific Editor IJMS. Jordan University of Science and Technology, Ar Ramtha, Jordan.
[3] Student Editor IJMS. University of Oxford, Oxford, England, UK.
[4] Associate Editor of Original Articles IJMS. Bangalore Medical College and Research Institute, Bangalore, India.

Correspondence:
Francisco J. Bonilla-Escobar, MD, MSc(c)
Address: Cisalva Institute, University of Valle, Cali, Colombia.
Email: editor.in.chief@ijms.info

plagiarism or fabrication in the IJMS Manuscript Evaluation and the Peer Reviews Evaluation Form, respectively. Those two internal evaluation forms were constructed by the IJMS Executive Committee in order for the manuscript editors and reviewers to check the value of submissions to scientific literature; 7- Ownership and management: stated on the website; 8- Web site: www.ijms.info; 9- Name of Journal: the International Journal of Medical Students, a unique name and descriptive of the journal mission and vision; 10- Conflicts of interest: adopted from the ICMJE and clearly stated in the instructions for authors; 11- Access: clearly defined as online and open to all readers without subscription fees; 12- Revenue sources; 13- Advertising; 14- Publishing schedule: as tri-annual; 15- Archiving; 16- Direct marketing.

Additional details on each point can be accessed through the WAME website (Available from: http://www.wame.org/resources/principles-of-transparency-and-best-practice-in-scholarly-publishing. Updated 2013 Dec 19, Cited 2014 Jan 31). All of the principles stated are clearly evident on the IJMS website.

Authors do not hold the sole responsibility for publications. Editorial teams and editors complement authors and must follow principles of transparency to guarantee best practice in editorial processing. Thus, the IJMS supports the principles promoted by the EQUATOR (Enhancing the QUAlity and Transparency Of health Research) Network (www.equator-network.org [Access: 01 29 2014]).

During the editorial process of the IJMS, editors consult the EQUATOR reporting guidelines as part of evaluating the manuscript at hand and request authors adhere to them. Although editors often say that it is difficult to ensure compliance with these reporting guidelines; the IJMS is a unique journal aimed at medical students who should be a primary target for training in good research and publication practice. We hope to establish good habits as researchers and physicians at the beginning of their scientific journeys.

Please feel free to contact our Editorial Team with any questions or discussion related to this topic. Transparency is a central goal for the IJMS, and is key in our continued drive for improvement. The IJMS was created by medical students for medical students and continues to grow to be the most important means of scientific publication for medical students around the world. Through implementing transparency principles we can educate and inspire a generation about the necessity of these approaches to advance the scientific community.

References

1. Dubben HH, Beck-Bornholdt HP. Systematic review of publication bias in studies on publication bias. BMJ. 2005;331(7514):433-4.

2. Altman DG, Moher D. Declaration of transparency for each research article. An antidote to inadequate reporting of research. BMJ 2013;347:f4796.

Acknowledgments
None.

Conflict of Interest Statement & Funding
The authors have no funding, financial relationships or conflicts of interest to disclose.

Cite as:
Bonilla-Escobar FJ, Gharaibeh A, Mires SJ, Abhishek HA. Transparency in the International Journal of Medical Students. Int J Med Students. 2014;2(1):6-7.

IJMS International Journal of Medical Students

Original Article

Should Research Thesis be a Prerequisite for Doctor of Medicine Degree? A Cross-sectional Study at Jordan University of Science and Technology

Aisha Gharaibeh,[1] Yazan S. Mousa.[1]

Abstract

Background: University based research is an integral part of many prestigious medical schools worldwide. The benefits of student-conducted research have long been highlighted in the literature. This article aims to identify the insights of medical students concerning research training, including perceived hurdles in the way of conducting research, and the utility of a research thesis in acquiring a Doctor of Medicine degree. **Methods:** A total of 808 medical students at Jordan University of Science and Technology were selected by random sampling with a confidence level of 95%. A survey was constructed by a group of students through literature review and group discussions. The survey utilized polar and Likert scale questions to collect data from the students. Statistical inferences were then obtained through analysis of means and one sample t-test of the hypothesis. **Results:** A total of 687 students filled out the survey (85%). Analysis shows that respondents have a strong and positive attitude towards research. The respondents with past research experience constituted 14.3% of those surveyed. Those respondents identified the barriers faced by them during their experience. The students showed high degree of agreement that a research thesis should be a prerequisite for graduation with statistical significance of p-value ,0.05. **Conclusion:** Modifying the curriculum to include research methodology is recommended, and developing it to incorporate a thesis as a requirement for graduation may be advised upon further review.

Keywords: Medical Students, Jordan, Biomedical Research, Educational Needs Assessment (Source: MeSH-NLM).

Introduction

It is now well-established that research is a corner stone of medical education; it has always been the platform upon which a well oriented physician stood to be an integral part of academic and applied medicine.[1]

Previous literature has proposed that involving medical students in research early in their careers is a long-term strategy for promoting health research.[2,3] In Germany, for example, medical students contributed to 28% of the publications in one institution, including first authorship in 7.8% of papers.[4] In Croatia, 23% of undergraduate students have been involved in scientific research, with 38% publishing their results.[5]

Furthermore, if the experience of doing research as a student does not lead to a later career in academic medicine, a research experience can help in improving students' skills in searching and critically appraising the published medical literature, as well as obtaining skills to pursue independent research and publication.[6,7]

In Jordan however, the percentage of undergraduate research and medical student's perception of it remain unclear. Another issue that is debated in the field of medical education is the integration of research as part of medical school's curriculum or as a mandatory requirement for graduation from medical school.[8]

Jordan has been ranked as the country with the highest number of researchers per million people out of the 57 members of the Organization of Islamic Countries (OIC), with 1,927 researchers per million people in Jordan as opposed to an average of 500 for the OIC.[9] This number puts Jordan ahead of countries like Greece, Israel and Italy, and close to that of the United Kingdom and Ireland. That being said, Jordanian medical schools are lacking in terms of postgraduate research programs, such as a Master's or PhD degree, translating to weak medical research in the educational infrastructure. Furthermore, a public study showed a high tendency toward investing in research as a country,[10] making biomedical research in Jordan not only an educational need, but a national issue as well.

The aim of this study is to assess the opinion of medical students at Jordan University of Science and Technology as to whether a research thesis should be a prerequisite for Medical Doctorate degree, and identify the barriers students face when conducting research. The conclusions of this study are expected to aid decision makers in medical education to make an

About the author: *Aisha is a fifth-year medical student at JUST. She is a recipient of Jordan Ministry of Higher Education and Scientific Research Scholarship for Distinguished Students to study Medicine and Surgery between the years 2009 and 2015.*

Submission: Nov. 15, 2013
Acceptance: Jan. 5, 2014
Process: Peer-reviewed

[1] Jordan University of Science and Technology, ArRamtha, Irbid, Jordan.

Correspondence:
Aisha K Gharaibeh
Address: Jordan University of Science and Technology Faculty of Medicine, ArRamtha, Irbid, Jordan 22110.
Email: akgaribeh09@med.just.edu.jo

evidence-based decision in improving the curriculum, supporting the already established literature on the significance of involving medical students in research activities.

Methods

This cross-sectional study utilized a structured, self-administered questionnaire, constructed using Google forms. It is best described as a cross-sectional observational study design in that it was used to collect data from medical students at a specific point in time. The rationale for using a questionnaire to collect data was that it was the most efficient way to gather the data directly from students. The variables tested were independent, categorical variables, some of them were nominal, others were dichotomous, or ordinal, depending on the nature of the question.

The authors followed the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement in writing this article.[11] The STROBE Statement checklist of items that should be included in reports of cross-sectional studies was adhered to as a guideline.

Participants were chosen by simple random sampling. The sampling frame were the registration lists, which include all student demographic data and contact information. The questionnaire was distributed in electronic format via e-mail to 808 medical students at Jordan University of Science and Technology (JUST), first- through sixth-year, confidence level 95% with confidence interval of 3. The total target population count was 3329 students; the number of students enrolled in the JUST Faculty of Medicine, from first- through sixth-year, in the academic year 2012/2013. It was distributed between April 15th - 30th, 2013. Questionnaires were filled out by 687 students (85.0%).

The questionnaire used in this study was designed by a group of students using thorough literature review and through group discussion, under the guidance of the authors and a professor in medical education. It was validated by experts in biostatics and questionnaire construction. The survey was pilot-tested by 25 students for face-validity and comprehensibility before study commencement.[12,13] Those 25 students were randomly selected to answer the questionnaire draft on paper. The idea of the study was explained to those students, and feedback was collected for format, clarity and filling time.

The questionnaire intended to poll the opinion of medical students at JUST about research as a prerequisite for graduation from medical school. It consisted of three pages with 20 questions, English language was used considering that it is the medium of instruction at the faculty. Eight questions assessed the demographic aspects of the participants. Six questions assessed the students' attitudes towards research. Six questions assessed the perception of barriers for conduction of research and whether it should be a prerequisite for graduation. These last six questions were only for those who had previous experience in research (a question asked before this part). Those 5 questions utilized the 5-point Likert Scale,[14] and were close-ended with possible responses including: strongly agree, agree, neutral, disagree, and strongly disagree; with 5 as strongly agree and 1 as strongly disagree. The same applied to questions on their perception about research. According to our pilot study, the students needed an average of 5 minutes to complete the questionnaire.

Table 1. Characteristics of Students who responded to the Electronic Questionnaire at Jordan University of Science and Technology

Variable	Frequency (total 687)	Percent (%)
Mean age (years)	21.12	-
Male gender	380	55.31
Level of study (year)		
1st	92	13.39
2nd	155	22.56
3rd	160	23.29
4th	157	22.85
5th	80	11.64
6th	43	6.26
Jordan as country of origin	369	53.71
Public secondary school	413	60.1
University grade point average		
Pass (less than 70)	80	11.64
Good or very good (70 – lower than 80)	223	32.46
Excellent or distinguished (higher than 80)	384	55.90
Father's educational level		
Master/PhD	267	38.86
Diploma/Bachelor	316	46.00
Primary or secondary school	104	15.14
Mother's educational level		
Master/PhD	97	14.12
Diploma/Bachelor	438	63.76
Primary or secondary school	152	22.12
Involved in extra-curricular activities	304	44.25

The Statistical Package for Social Sciences (SPSS) version 20.0 was used for all data entry and analyses.[15] All descriptive statistics were presented as proportions. Statistical inferences were obtained through analysis of means and one sample t-test to test the hypothesis. P-values ≤0.05 were regarded as statistically significant.

Results

Six-hundred-eighty-seven (687) students responded to the questionnaire out of a total of 808 students received it. The mean age of respondents was 21.1 (SD 1.88). Males constituted 55.31% while females only 44.69% of respondents, in contrast to the actual percentage of males at the JUST Faculty of Medicine (48%), rendering males overrepresented in the study. The proportions of respondents from second, third and fifth-year levels of study were similar to their corresponding proportions at JUST, while first and sixth year students were underrepresented (13.38 and 6.26% compared to an actual 18.49 and 9.01%, respectively), and fourth year students were overrepresented (22.85% compared to an actual 15.0%).

Non-Jordanians constituted 44.69% of respondents from at least twenty different countries. Slightly less than two-thirds reported graduating from a public secondary school. More than half of respondents have a Grade Point Average (GPA) higher than 80%. The highest proportion of medical students described their parents' educational level as completion of a diploma or bachelor's degree. Nearly 44% of respondents were involved in extra-curricular activities. These characteristics are summarized in ***Table 1***. All the questions were accounted for and there was no missing data. The Google forms' "make this item required" option was utilized in the majority of questionnaire items, but even questions that weren't set as mandatory were completed fully by respondents.

Analyses show that respondents have a strong and positive attitude towards research, as assessed using a 5-point Likert scale. The mean indicated high agreement degree (around 4.5) for biomedical research as an opportunity to improve one's scientific knowledge and to develop critical and analytical thinking. With a slightly less degree, students highly agreed to associate physician success with respective research experience. With a mean of 3.4, students were in less agreement that research is time consuming on the expense of curricular studying. See ***Table 2***.

The number of respondents with past research experience was 98 students (14.3%). These students were asked further questions to identify barriers they faced when conducting research. There was a high degree of agreement with the barriers pre-specified by the questionnaire constructors with a mean of 3.95. These barriers are summarized in ***Table 3***.

The hypothesis tested was whether there is a statistically significant effect of medical students' opinion that a research thesis should be a prerequisite for graduation from medical school, at a significance level of alpha ,0.05. To test this hypothesis, one sample t-test was applied to explore effect for the medical students' attitudes toward research and whether it should be a prerequisite for graduation (test value 3 for five Likert scale). The mean was 3.89 with standard deviation of 0.75 and degree of freedom of 686. The one sample t-test statistic was 31.230 (p=0.00) indicating that the mean of 3.89 is statistically significant and we can accept the hypothesis.

Discussion

The results of this study confirm that, at the time of administration of the questionnaire, medical students at JUST had a positive attitude about joining research activities to increase their scientific knowledge, as well as enhancing their skills of critical and analytical thinking. Students also expressed positive perceptions for development of a curriculum that includes a research thesis as a prerequisite for graduation. This indicates that students at the Faculty of Medicine at JUST are interested in research from a theoretical point of view, and comes in direct correlation with the institutional ranking as the top research university in the country. [16]

On the other hand, results clearly show that the number of research participants does not meet the aspirations of the students, or the vision of the university at large to become a regional pioneer in research through promotion of research among its students. Taken together, respondents are positive about joining research activities, and it is the responsibility of decision making personnel at the faculty to take proper measures in integrating research and possibly a thesis into the medical curriculum. The prospect of establishing a medical PhD program may also be worth consideration.

Limitations of our study include the notion that perhaps only students interested in research to begin with took part in the study, which may explain the 15% who chose not to respond as

Table 2. Responding Student Perceptions of Research at JUST

No.	Items	Mean	Standard Deviation	Rank	Agreement Degree
1	Biomedical research gives the medical student an opportunity to improve his/her scientific knowledge	4.53	0.65	1	High
2	Biomedical research helps in development of critical and analytical thinking	4.53	0.63	1	High
3	Involvement in biomedical research as a student consumes time at the expense of curricular studying.	3.41	0.92	5	Medium
4	A successful physician is an experienced researcher	3.98	0.90	3	High
5	Research should be set in medical school curriculum as a requisite for graduation.	3.81	1.00	4	High
Total Means		**4.05**	**0.83**	**-**	**High**

Table 3. Perceived Barriers by Medical Students to Conduct Research

No.	Items	Mean	Standard Deviation	Rank	Agreement Degree
1	Access to facilities such as laboratories and samples.	3.87	0.88	4	High
2	Funding (finding financial support).	3.91	0.95	3	High
3	Lack of research supervision and guidance.	4.01	0.94	1	High
4	Lack of good support from the laboratory staff.	4.00	0.93	2	High
Total Means		**3.95**	**0.64**	-	**High**

being uninterested, and might lead us to interpret the results obtained as being an overrepresentation of the actual number of students who deemed research a topic of interest.

In addition to results obtained about perceived barriers to conduct research by medical students, who strongly identified with the constraints set forth in the questionnaire, further investigation may be necessary to highlight barriers as perceived by faculty and staff members themselves. Another issue that should be emphasized is a large student-teacher ratio which may render research activities impractical. Faculty may be unwilling to include students in research that may impede career prospects, or consume time at the expense of clinic hours.[17]

The present study was conducted in light of many purposes, among which is the increasing awareness of engagement of medical students in research projects to improve their academic and clinical reasoning It has been highlighted in previous literature that in many developing countries including Jordan, research is not a mandatory component of medical education,[18] and is largely under-represented even though such experiences can have a positive impact on the quality of medical education.[2,3,19]

Medical students in Germany, for instance, are obliged to write a research thesis to acquire the title of medical doctor.[4] In a study by Ogunyemi D et al. in California, students were able to conduct and present a primary care research project as a requirement of their medical training, and most students found the experience to be beneficial and positive.[20] However, a study by Frishman WH. in New York found that although 97% of students felt that the research experience was a useful replacement for fourth-year electives, only 18% responded that it should be a requirement for graduation.[13]

This study has brought us to conclude that research initiatives by medical students at JUST may be insufficient, and that this likely negatively affects the quality of education at the faculty, as well as the overall scientific output from this institute of higher learning. Modifying the curriculum to include research methodology as a first phase is recommended, and developing it to incorporate a thesis as a requirement for graduation may be advised upon further review. The ten suggestions in Boyor's report for improving undergraduate education to make research-based learning the standard may serve as guidelines for future improvement in the university's curriculums.[21]

References

1. Institute of Medicine. Beyond the HIPAA Privacy Rule: Enhancing Privacy, Improving Health Through Research. Washington, DC: The National Academies Press. 2009;111-22.

2. Aslam F, Shakir M, Qayyum MA. Why medical students are crucial to the future of research in South Asia. PLoS Med. 2005;2(11):e322.

3. Khan H, Khawaja MR, Waheed A, Rauf MA, Fatmi Z. Knowledge and attitudes about health research amongst a group of Pakistani medical students. BMC Med Educ. 2006;6:54.

4. Cursiefen C, Altunbas A. Contribution of medical student research to the Medline-indexed publications of a German medical faculty. Med Educ. 1998;32(4):439-40.

5. Kolcic I, Polasek O, Mihalj H, Gombac E, Kraljevic V, Kraljevic I, et al. Research involvement, specialty choice, and emigration preferences of final year medical students in croatia. Croat Med J. 2005;46(1):88-95.

6. Houlden RL, Raja JB, Collier CP, Clark AF, Waugh JM. Medical students' perceptions of an undergraduate research elective. Med Teach. 2004;26(7):659-61.

7. Siemens DR, Punnen S, Wong J, Kanji N. A survey on the attitudes towards research in medical school. BMC Med Educ. 2010;10:4.

8. Mostafa SR, Khashab SK, Fouaad AS, Abdel Baky MA, Waly AM. Engaging undergraduate medical students in health research: students' perceptions and attitudes, and evaluation of a training workshop on research methodology. J Egypt Public Health Assoc. 2006;81(1-2):99-118.

9. Butler D. Islam and Science: the data gap. Nature. 2006;444(7115):26-7.

10. Ahram M, Othman A, Shahrouri M. Public support and consent preference for biomedical research and biobanking in Jordan. Eur J Hum Genet. 2013; 21(5): 567-70.

11. von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370(9596):1453-7.

12. Van Teijlingen ER, Rennie AM, Hundley V, Graham W. The importance of conducting and reporting pilot studies: the example of the Scottish Births Survey. J Adv Nurs. 2001;34(3):289-95.

13. Frishman WH. Student research projects and theses: should they be a requirement for medical school graduation? Heart Dis. 2001;3(3):140-4.

14. Drinkwater BL. A comparison of the direction-of-perception technique with the Likert method in the measurement of attitudes. J Soc Psychol. 1965;67(2):189-96.

15. IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.

16. Statistical, Economic, and Social Research and Training Centre for Islamic Countries. Academic Rankings of universities in the OIC Countries: A Preliminary Report. 2007 April.

17. Forester JP, McWhorter DL. Medical students' perceptions of medical education research and their roles as participants. Acad Med. 2005;80(8):780-5.

18. Pawar DB, Gawde SR, Marathe PA. Awareness about medical research among resident doctors in a tertiary care hospital: A cross-sectional survey. Perspect Clin Res. 2012; 3(2):57-61.

19. Sumathipala A, Siribaddana S, Patel V. Under-representation of developing countries in the research literature: ethical issues arising from a survey of five leading medical journals. BMC Med Ethics. 2004; 5: E5.

20. Ogunyemi D, Bazargan M, Norris K, Jones-Quaidoo S, Wolf K, Edelstein R, et al. The development of a mandatory medical thesis in an urban medical school. Teach Learn Med. 2005;17(4):363-9.

21. Alberts J, Booth WC, Glaser M, Glassic CE, Ikenberry SO, Kenny SS, O'Neil RM, Reid-Wallace C, Tien C, & Yang CN. (1998). Reinventing Undergraduate Education: A Blueprint for America's Research Universities. Retrieved from ERIC database. (ED424840)

Acknowledgments

JUST Faculty of Medicine, especially the Dean, Dr Tawfik Daradkeh, and his assistants for their unconditional support of the scientific improvement of the Faculty students. The group members who contributed to the literature review and collecting data: Ahmad Jarrar, Haytham Abdel-qader, Hiba Salhah, Marwa Nairat, Muhamad Hariz Hazwan Mohd Zarir, Omar Shunnar, Rim Kasim Ali, Sewar Abo Arqob, Tareq Kiwan, and Zainab Yusuf.

Conflict of Interest Statement & Funding

The authors have no funding, financial relationships or conflicts of interest to disclose.

Cite as:

Gharaibeh A, Mousa YS. Should Research Thesis be a Prerequisite for Doctor of Medicine Degree? A Cross-sectional Study at Jordan University of Science and Technology. Int J Med Students. 2014;2(1):8-12.

Gender Differences in Response to Experimental Pain among Medical Students from a Western State of India

Pratik Akhani,[1] Samir Mendpara,[2] Bhupendra Palan,[1] Jaman Harsoda.[1]

Abstract

Background: Pain is one of the most common reasons for patients to seek medical attention and it causes considerable human suffering. Pain is a complex perception that differs enormously among individual patients. Gender plays an important role in how pain is experienced, coped with and treated. Even young healthy individuals often differ in how they perceive and cope with pain. This study was done to investigate gender differences in response to experimental pain among medical students from a western state in India. **Methods:** A total of 150 medical students (86 males and 64 females) participated in this interventional study. The Cold Pressor Test was used to exert experimental pain. To study the response, cardiovascular measures (radial pulse, systolic blood pressure and diastolic blood pressure) and pain sensitivity parameters (pain threshold, pain tolerance and pain rating) were assessed. **Results:** No significant difference was found in cardiovascular response to experimental pain between both the genders ($p>0.05$). Pain threshold and pain tolerance were found to be significantly higher in males whereas pain rating was found to be significantly higher in females ($p<0.01$). Pulse reactivity showed a negative relationship with pain threshold and pain tolerance whereas a positive relationship with pain rating, however no statistically significant relation was found between these measures. **Conclusion:** Females display greater pain sensitivity than males. Different pain perception might account for gender difference in pulse reactivity.

Keywords: Sex, Pain, Pain threshold, Pulse, Blood pressure (Source: MeSH-NLM).

About the author: *Dr. Pratik N. Akhani is currently second year post graduate student of SBKS medical college, Vadodara, India of a three-years program in their medical school.*

Introduction

Pain is the most common complaint that significantly contributes to patient suffering. Pain is an unpleasant feeling often caused by an intense or damaging stimuli, such as stubbing a toe, burning a finger, or putting alcohol on a cut. The International Association for the Study of Pain's widely used definition states: "Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Pain is a complex neuro-physiological and psychological process that differs enormously among individual patients, even those who have similar injuries or illnesses.[1]

Gender plays an important role in how pain is experienced, coped with and treated.[2] Even young males and females often differ in how they perceive and cope with pain.[3] In recent years gender differences in response to pain have received increased attention and multiple studies have investigated these differences using a wide variety of noxious stimuli.[4] A number of studies have demonstrated a higher prevalence of chronic pain states and greater pain sensitivity among females compared with males.[5] The expansive body of literature in this area suggests that females have lower pain thresholds and tolerance to a range of pain stimuli when compared to males. Additionally, females generally report experiencing more recurrent pain, more severe pain and longer lasting pain than males.[6] Many of the observed gender differences in pain prevalence (i.e., headache, abdominal and visceral pain) appear to reduce beyond the reproductive years.[6] Males and females respond differently to various classes of pain medications, suggesting that physical pain relieving systems may differ in the two genders.[7] There is a growing body of literature that indicates females are more likely than males to be undertreated for their pain. It appears that gender affects not only pain perception, pain coping, and pain reporting, but also pain-related behaviors, including use of healthcare and the social welfare system.[8]

Gender differences in pain perception can vary across different cultures.[6] There are not many studies regarding gender differences in pain perception from healthy individuals in India. We sought to illuminate whether gender differences exist in response to experimental noxious stimulus in young healthy medical students from a western state of India.

Methods

Prior approval for this study was obtained from Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC). It was an interventional study design with the cold pressor test being

Submission: Nov. 30, 2013
Acceptance: Jan. 27, 2014
Process: Peer-reviewed

[1] Department of Physiology, S. B. K. S. Medical Institute & Research Center, Sumandeep Vidyapeeth, Piparia-391760, Vadodara, Gujarat, India.
[2] Department of Physiology, C. U. Shah Medical College, Surendranagar-363001, Gujarat, India.

Correspondence:
Pratik N. Akhani
Address: S. B. K. S. Medical Institute & Research Center, Sumandeep Vidyapeeth, Piparia-391760, Vadodara, Gujarat, India.
Email: pratikakhani@yahoo.com.

the intervention. Data collection occurred before and after the cold pressor test. The study was conducted in the clinical laboratory, department of Physiology, S.B.K.S. medical institute and research centre. A total of 150 medical students (86 males and 64 females) from the S.B.K.S. medical institute and research centre participated as subjects. Written informed consent was obtained according to the ethical committee policy. Before testing, a detailed history was taken, followed by a general and systemic examination of subjects.

Young healthy students between 17-20 years of age, who were willing to give informed consent for participation, right handed (for selection of uniform study population, as handedness may affect sensitivity to pain.[9]), and females who were in pre-ovulatory phase of menstrual cycle (for selection of uniform study population, as pain perception may vary during different phases of menstrual cycle.[10]) were included in the study.

Students with a history of local/bone injury in the right hand (as this hand will be immersed in cold water), who were on any form of diet or exercise regime for weight loss or gain, who were taking any analgesics (as analgesics will reduce pain perception), and who were taking medications which may affect the Autonomic Nervous System were excluded. Students suffering from any known illness affecting or involving the Autonomic Nervous System e.g. Diabetes Mellitus, Thyroid disorder, any cardiovascular or neuropsychiatric disorder, any menstrual irregularities or disorders were also excluded from the study.

As showed in the CONSORT (Consolidated Standards of Reporting Trials) diagram,[11] out of a total of 186 students who were approached for study, 150 were selected for study according to the inclusion and exclusion criteria ***(Figure 1)***.

The height was recorded during inspiration using a stadiometer. The subject was asked to stand erect on the stadiometer bare foot. The horizontal bar of the stadiometer was placed on the vertex of the subject and the readings were recorded.

Body mass was measured by a digital standing scale. The subject was asked to stand erect on the digital weighing machine bare foot and wearing light clothes. The readings were recorded from the digital scale of the weighing machine.

Body Mass Index measurement: The Body Mass Index (BMI) was calculated using the following formula:

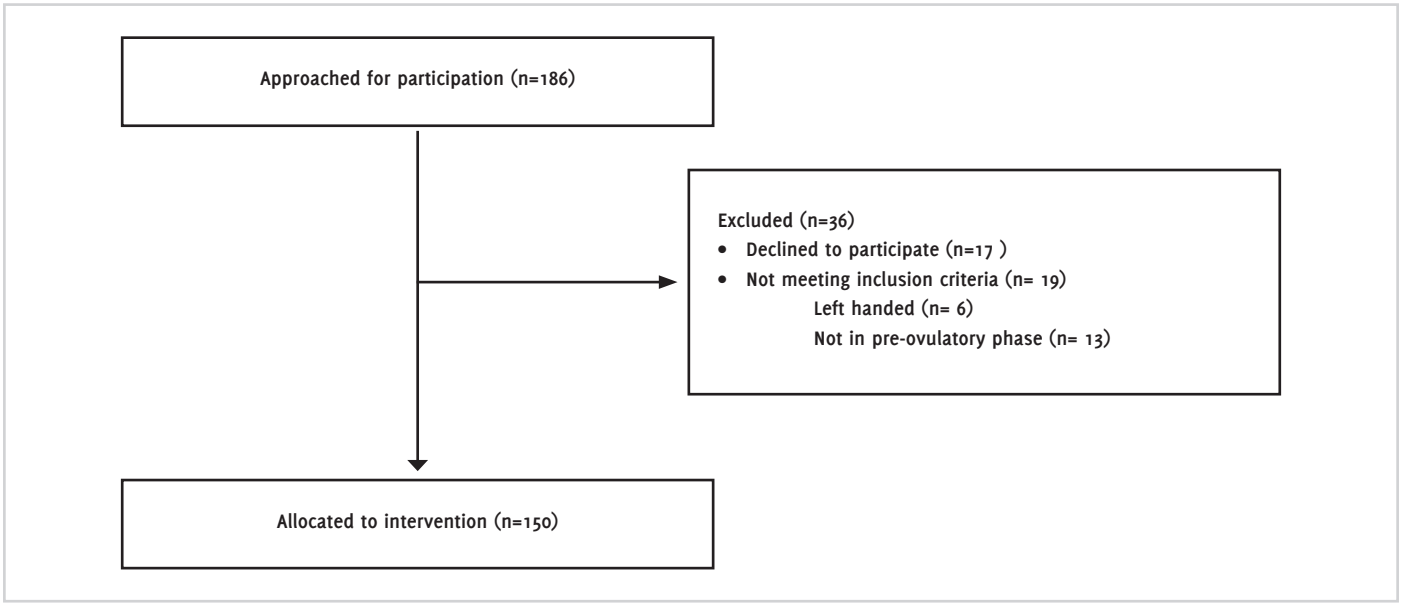
Body mass index (BMI) = Weight (in kg)/Height^2 (in m^2).[12]

For the Cold Pressor Test (experimental noxious thermal stimulus) subjects were asked to sit comfortably in a chair. After 10 minutes rest, the radial pulse, systolic blood pressure and diastolic blood pressure were recorded. A Laboratory water bath was filled with ice cold water, the temperature of which was maintained between 4° C and 8° C thorough the test using a laboratory thermometer.[13] After that, the subject was asked to immerse his or her right hand into the laboratory water bath (palm down, water up to 5 cm above wrist level). Immediately, two stop watches were started. Subject was asked to determine intensity of pain during test and rate it on a scale of 0 to 10, Zero being no pain at all while 10 being the worst imaginable pain.[14] When the subject felt pain for the first time, one stop watch was stopped. This time was taken as pain threshold (first feeling of pain). Once the pain was unbearable, the participant removed his or her hand and the second stop watch was stopped. This time was taken as pain tolerance. Immediately after the test, the radial pulse, systolic blood pressure and diastolic blood pressure were recorded. Blood pressures were recorded using a standardized mercury sphygmomanometer. All the measurements were done by a trained laboratory technician.

All the instruments were calibrated regularly using standard procedure as indicated.

Statistical analysis was done using SPSS version 17®. Unpaired students t-test and Pearson's correlation were applied, p-values < 0.05 were considered significant.

Figure 1. CONSORT diagram showing selection of participants for study.



Results

The study population included 86 male students and 64 female students ***(Table 1)***. The mean age of male students was 18.57 years and of female students was 18.37 years (p=0.33). The mean height of male students was 1.57 meters and of female students was 1.58 meters (p=0.43). The mean body mass of male students was 53.42 Kg and of female students was 52.65 Kg (p=0.50). The mean Body Mass Index of male students was 21.79 Kg/m^2 and of female students was 21.14 Kg/m^2 (p=0.11). Thus, the anthropometric parameters of both the study groups were fairly uniform with p>0.05 for all the parameters.

Table 1. Age and anthropometric data of the study population (Unpaired student's t-test).

Parameter	Male (n=86) [Mean ± SD]	Female (n=64) [Mean ± SD]	p value
Age (in years)	18.57 ± 0.77	18.37 ± 0.81	0.33
Height (in meters)	1.57 ± 0.05	1.58 ± 0.06	0.43
Weight (in Kg)	53.42 ± 3.79	52.65 ± 4.80	0.50
Body Mass Index (Kg/m^2)	21.79 ± 1.61	21.14 ± 1.49	0.11

*p<0.05-statistically significant.

Table 2 shows gender differences in cardiovascular parameters in response to experimental pain. Mean pulse reactivity was higher in females (15.04 beats/minute) as compared to males (12.91 beats/minute), but this difference was not significant (p=0.054). Mean systolic blood pressure reactivity was found to be higher in females (9.26 mmHg) as compared to males (8.9 mmHg), but this difference was not significant (p=0.7). Also, mean diastolic blood pressure reactivity was found to be higher in females (6.3 mmHg) as compared to males (5.33 mmHg), but this difference was not significant (p=0.26). Thus, there was no difference in cardiovascular response to experimental pain in both the genders with p>0.05 for all the parameters.

Table 2. Gender differences in cardiovascular parameters in response to experimental pain (Unpaired student's t-test).

Parameter (Post test value minus Pre test value)	Male (n=86) [Mean ± SD]	Female (n=64) [Mean ± SD]	p value
Pulse reactivity (beats/minute)	12.91 ± 8.69	15.04 ± 6.76	0.054
Systolic blood pressure reactivity (mmHg)	8.9 ± 7.1	9.26 ± 6.28	0.70
Diastolic blood pressure reactivity (mmHg)	5.33 ± 5.81	6.3 ± 6.26	0.26

p<0.05-statistically significant.

Table 3 shows gender differences in pain sensitivity parameters in response to experimental pain. Males showed higher pain threshold (mean 22.57 seconds) as compared to females (mean 19.21 seconds) with p<0.05. Males showed higher pain tolerence (mean 77.68 seconds) as compared to females (mean 57.92 seconds) with p<0.05. Pain rating during experimental pain was found to be higher in females (mean 6.34) as compared to males (mean 5.45) with p<0.05. Thus, females were found to be more sensitive to pain than males.

Pulse reactivity showed a negative relationship with pain threshold and pain tolerance while a positive relationship with pain rating ***(Table 4)***, however no statistically significant relation was found between these measures (p>0.05 for all correlations).

Discussion

Pain threshold and pain tolerance during experimental pain were found to be significantly higher in males, whereas pain rating was found to be significantly higher in females. Thus females displayed greater pain sensitivity than males, a finding similar to Fillingim et al,[15] and Riley et al.[16] However Nie H et al,[17] found that females showed lower pain thresholds than males, but this difference was not significant and was likely due to small sample size (12 males, 12 females). The mechanisms underlying these differences remain unclear. One possible explanation suggests that males are more motivated to tolerate and suppress expressions of pain because of the masculine gender role, whereas the feminine gender role encourages pain expression and produces lower motivation to tolerate pain among females.[18] Other mechanisms have been proposed to explain the differing response to experimental pain between the genders, including hormonal factors, differences in pain modulatory systems, and genetic factors. From a more psychosocial perspective, another potential explanation for the gender difference in pain responses involves social role expectancies. Different pain perception might account for gender difference in pulse reactivity. Hormonal influences may play a minor role.[19]

Sex hormones have effects throughout the nervous system and their plasma concentrations change on a regular basis among both females and males. Also, hormone levels change throughout the menstrual cycle, during pregnancy, and after menopause in females. These differences may have major consequences for the pain perception.[20] For example, a correlation between elevated estrogen levels and perception of experimental heat pain has been shown in some studies where elevated estrogen levels were associated with a lower heat tolerance threshold and heat pain.[21] In females, the pain modulatory system shows menstrual variation with more effect in the ovulatory phase of cycle compared to the menstrual and luteal phase.[22,23] Whereas males, in spite of a significant decrease in their testosterone levels with advancing age, appear to be less vulnerable to changes in sex hormone levels during their entire lifespan.[20]

In this study, we found an inverse trend between pulse reactivity and pain sensitivity as indicated by pain threshold and

Table 3. Gender differences in Pain sensitivity parameters in response to experimental pain.

Parameter (Post test value minus Pre test value)	Male (n=86) (Mean ± SD)	Female (n=64) (Mean ± SD)	p value
Pain threshold (seconds)	22.57 ± 6.81	19.21 ± 6.95	<0.01**
Pain tolerance (seconds)	77.68 ± 18.62	57.92 ± 14.47	<0.01**
Pain rating (0 to 10)	5.45 ± 1.18	6.34 ± 1.16	<0.01**

*p<0.05-statistically significant, **p<0.01-highly significant.

pain tolerance. This relation was also found by Myers et al.,[24] and Otto and Dougher in their studies.[25]

No difference was found in cardiovascular response to experimental pain between both the genders, a finding similar to Myers et al.[24] There is no consensus regarding the reactivity-pain relationship, some studies found a direct relationship between systolic blood pressure reactivity and pain,[26–29] and others found an inverse relationship.[30,31] One possible explanation may be our measure of reactivity as several participants withdrew their hand from the cold water in very short time. An interplay of blood pressure levels, sympathetic nervous system and baroreceptor activity could explain the relationship between blood pressure and response to experimental pain.

Table 4. Correlation of Pulse reactivity with Pain Threshold, Pain tolerance and Pain rating (Pearson's correlation).

Characteristic		Pain Threshold	Pain tolerance	Pain rating
Male	Pulse reactivity	r = - 0.045, p = 0.7539	r = - 0.044, p = 0.7594	r = 0.23, p = 0.11
Female	Pulse reactivity	r = -0.144, p = 0.3173	r = -0.0086, p = 0.9522	r = 0.12, p = 0.42

*p<0.05-statistically significant.

Pain causes sympathetic stimulation and elevates blood pressure levels which stimulates baroreceptors. These activated baroreceptors, in turn, initiate a signaling cascade that causes modulation of descending pain pathways to inhibit pain. The theory of hypertensive hypoalgesia suggests that elevated resting blood pressure levels will allow for a quicker stimulation of this baroreceptor mediated pain inhibitory activity with pain induced sympathetic arousal causing decreased pain perception in hypertensive individuals.[32,33]

Pain is a complex and subjective experience. There may be gender differences in the neural mechanisms that mediate pain perception. Size as well as morphology of various brain structures such as the corpus callosum, planum temporal, preoptic hypothalamic area, and percentage of grey matter show gender differences.[34-37] Resting regional cerebral blood flow rate and the cerebral metabolic rate of glucose utilization may also differ in both gender.[38-39] The human forebrain structures show gender related variation in their activation patterns in response to experimental noxious thermal stimulus e.g. females show significantly greater activation of the contralateral prefrontal cortex, contralateral insula and thalamus when compared to the males by positron emission tomography (PET) with intravenous injection of H_2O.[16,40] N-methyl-D-aspartate (NMDA) receptor function in the dorsal horn of spinal cord also differs in males and females.20 Sustained activation of NMDA receptors on the second order neurons by glutamate, released from tonically active afferent nerve endings, increases the excitability of these neurons causing increased nociceptive responses. Stimulation of NMDA receptors by the application of agonists (NMDA and glycine) and estradiol produces significantly larger currents in females than males.[41] The female central nervous system appears to be more sensitized to pain, as compared to male central nervous system, due to this estrogenic increase in excitability of spinal NMDA receptors.[20]

Many other factors that may be held responsible for gender differences in pain perception include race and ethnicity of person, endogenous and exogenous pain modulation, gonadal hormones, cognitive or affective parameters such as coping processes, and catastrophizing, the RIII reflex, pain related behaviors, social role expectancies, past painful experiences and genetic factors.[20]

Regarding the study limitations, more accurate and serial data could have been obtained if automated pulse and blood pressure (BP) recording had been done. Perceptions and reactivity to pain might be different in a real life situation compared to the laboratory set up. Moreover, we did not compared pain response between patients in a pathological state compared to those in a non-pathological state. Finally, we did not look into the hormonal and psycho-social aspects of the participants that could have been affected the pain response.

In conclusion our study suggests that gender of the subject plays a significant role in response to experimental pain with females being more sensitive to pain than males. There is a need for further research to investigate physiological, psychological, and socio-cultural influences on response to experimental pain.

References

1. IASP Sub-committee on Taxonomy. Pain terms: a list with definitions and notes on usage. Pain 1980;8:249-52.

2. Hoffmann DE, Tarzian AJ. The girl who cried pain: a bias against women in the treatment of pain. J Law Med Ethics. 2001;29(1):13-27.

3. International Association for the Study of Pain. Fact Sheet: Children with Chronic Pain-Sex and Gender Differences. 2007.

4. Lowery D, Fillingim RB, Wright RA. Wright. Sex differences and incentive effects on perceptual and cardiovascular responses to cold pressor pain. Psychosom Med. 2003;65(2):284-91.

5. Wiesenfeld-Hallin Z. Sex differences in pain perception. Gend Med. 2005;2(3):137-45.

6. International Association for the Study of Pain. Fact Sheet: Differences in Pain Between Women and Men. 2007.

7. International Association for the Study of Pain. Fact Sheet: Epidemiology of Pain in Women. 2007.

8. Unruh AM. Gender variations in clinical pain experience. Pain. 1996;65(2-3):123-67.

9. Pud D, Golan Y, Pesta R. Hand dominancy-a feature affecting sensitivity to pain. Neurosci Lett. 2009;467(3):237-40.

10. Joseph L. Riley, Michael E. Robinson, Emily A. Wise, Donald Price. A meta-analytic review of pain perception across the menstrual cycle. Pain. 1999;81(3):225-235.

11. Schulz KF, Altman DG, Moher D, for the CONSORT Group. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. Ann Int Med. 2010;152.

12. Garrow JS, Webster J. Quetelet's index (W/H2) as a measure of fatness. Int J Obes. 1985;9(2):147–53.

13. Mitchell LA, MacDonald RA, Brodie EE: Temperature and the cold pressor test. J Pain. 2004;5(4):233-7.

14. Joshi M. Evaluation of pain. Indian J. Anaesth. 2006;50(5):335-9.

15. Fillingim RB, Maixner W. Gender differences in the responses to noxious stimuli. Pain Forum. 1995;4(4):209-1.

16. Riley JL 3rd, Robinson ME, Wise EA, Myers CD, Fillingim RB. Sex differences in the perception of noxious experimental stimuli: A meta-analysis. Pain. 1998;74(2-3):181-7.

17. Nie H, Arendt-Nielsen L, Andersen H, Graven-Nielsen T. Temporal summation of pain evoked by mechanical stimulation in deep and superficial tissue. J Pain. 2005;6(6):348-5.

18. Myers CD, Robinson ME, Riley JL 3rd, Sheffield D. Sex, gender, and blood pressure: contributions to experimental pain report. Psychosom Med. 2001;63(4):545-50.

19. Berkley KJ. Sex differences in pain. Behav Brain Sci. 1997;20(3):371-80.

20. Fillingim RB, King CD, Ribeiro-Dasilva MC, Rahim-Williams B, Riley JL 3rd. Sex, Gender, and pain: A review of recent clinical and experimental findings. J Pain. 2009;10(5):447-85.

21. Fillingim RB et al. Ischemic but not thermal pain sensitivity varies across the menstrual cycle. Psychosom Med. 1997;59:512-520.

22. Yannick Tousignant-Laflamme, Serge Marchand. Excitatory and inhibitory pain mechanisms during the menstrual cycle in healthy women. Pain. 2009;146:47–55.

23. M. Teepker, M. Peters, H. Vedder, K. Schepelmann, S. Lautenbacher. Menstrual Variation in Experimental Pain: Correlation with Gonadal Hormones. Neuropsychobiology. 2010;61:131–40.

24. Myers CD, Robinson ME, Riley JL 3rd, Sheffield D. Sex, gender, and blood pressure: contributions to experimental pain report. Psychosom Med. 2001;63(4):545-50.

25. Otto MW, Dougher MJ. Sex differences and personality factors in responsivity to pain. Percept Mot Skills. 1985;61(2):383-90.

26. Schobel HP, Ringkamp M, Behrmann A, Forster C, Schmieder RE, Handwerker HO. Hemodynamic and sympathetic responses to painful stimuli in normotensive and borderline hypertensive subjects. Pain. 1966;66(2-3):117-24.

27. Peckerman A, Saab PG, McCabe PM, Skyler JS, Winters RW, Llabre MM et al. Blood pressure reactivity and perception of pain during the forehead cold pressor test. Psychophysiology. 1991;28(5):485-95.

28. Bruehl S, Carlson CR, McCubbin JA. The relationship between pain sensitivity and blood pressure in normotensives. Pain. 1992;48(3):463-7.

29. Maixner W, Humphrey C. Gender differences in pain and cardiovascular responses to forearm ischemia. Clin J Pain. 1993;9(1):16-25.

30. France CR, Stewart KM. Parental history of hypertension and enhanced cardiovascular reactivity are associated with decreased pain ratings. Psychophysiology. 1995;32(6):571-8.

31. Rosa C, Ghione S, Mezzasalma L, Pellegrini M, Basile Fasolo C, Giaconi S, et al. Relationship between pain sensitivity, cardiovascular reactivity to cold pressor test, and indexes of activity of the adrenergic and opioid system. Clin Exp Hypertens A. 1988;10 Suppl 1:383-90.

32. Bruehl S, Chung OY. Interactions between the cardiovascular and pain regulatory systems: an updated review of mechanisms and possible alterations in chronic pain. Neurosci Biobehav Rev. 2004;28:395–414.

33. Bruehl S et al. Hypoalgesia associated with elevated resting blood pressure: evidence for endogenous opioid involvement. J Behav Med. 2010;33:168–176.

34. Swaab DF, Fliers E. A sexually dimorphic nucleus in the human brain. Science. 1985;228(4703):1112-5.

35. Allen LS, Gorski RA. Sex difference in the bed nucleus of the stria terminalis of the human brain J Comp Neurol. 1990;302(4):697-706.

36. Allen LS, Gorski RA. Sexual dimorphism of the anterior commissure and massa intermedia of the human brain. J Comp Neurol. 1991;312(1):97-104.

37. Kulynych JJ, Vladar K, Jones DW, Weinberger DR. Gender differences in the normal lateralization of the supratemporal cortex: MRI surface-rendering morphology of Heschl's gyrus and planum temporale. Cereb Cortex. 1994;4(2):107-18.

38. Gur RC, Mozley LH, Mozley PD, Resnick SM, Karp JS, Alavi A, et al. Sex differences in regional cerebral glucose metabolism during a resting state. Science. 1995;267(5197):528-31.

39. Andreason PJ, Zametkin AJ, Gus AC, Baldwin P, Cohen RM. Gender-related differences in regional cerebral glucose metabolism in normal volunteers. Psychiatry Res. 1994;51(2):175-83.

40. Gender differences in pain perception and patterns of cerebral activation during noxious heat stimulus in humans. Pain. 1998;76(1-2):223-9.

41. McRoberts JA, Li J, Ennes HS, Mayer EA. Sex-dependent differences in the activity and modulation of N-methyl-d-aspartic acid receptors in rat dorsal root ganglia neurons. Neuroscience. 2007;21(148):1015–20.

Acknowledgments
None.

Conflict of Interest Statement & Funding
The authors have no funding, financial relationships or conflicts of interest to disclose.

Cite as:
Akhani PN, Mendpara SJ, Palan BM, Harsoda JM. Gender Differences in Response to Experimental Pain Among Medical Students from a Western State of India. Int J Med Students. 2014;2(1):13-7.

IJMS International Journal of Medical Students

Short Communication

Tobacco Usage among Males in Rural Tamil Nadu, India: A Cross-sectional Study

Kalaivani Annadurai,[1] Geetha Mani,[1] Raja Dhanasekaran.[1]

Abstract

Background: Knowing the prevalence of tobacco use and the socio-demographic profile of users might prove useful in further strengthening the information, education, communication and regulatory activities, thereby decreasing tobacco use. The objective was to study the prevalence and pattern of tobacco use among men aged 18 years and above in rural area of Tamil Nadu. **Methods:** A cross sectional study was performed among 714 males aged 18 years and above in Vadagarai village of Tamil Nadu during 2010 and interviewed with a pretested questionnaire. Systematic random sampling was used to select the participants. **Results:** Prevalence of smoking was found to be 36.7%. Cigarette smoking was more common than beedi and smokeless tobacco. **Conclusion:** Strict enforcement of anti-tobacco legislation and awareness measures targeting ill-effects of tobacco can be intensified to reduce tobacco related morbidity and mortality.

Keywords: Tobacco, Prevalence, Smoking (Source: MeSH-NLM).

About the Author: *Kalaivani Annadurai is a recently graduated public health physician and currently working as an assistant professor in the department of Community Medicine at Shri Sathya Sai Medical College and Research Institute.*

Introduction

Tobacco is the most important preventable cause of death and disease among adults. According to World Health Organization (WHO), globally about six million people die prematurely every year due to tobacco use, mostly cigarette smoking. More important is the fact that this epidemic of disease and death caused by tobacco is increasing very rapidly. By 2030 it is expected to kill more than eight million people per year, if there is no proper action (WHO. Tobacco-facts sheet. Available from: http://www.who.int/mediacentre/factsheets/fs339/en/, updated 2013 Jul, cited 2014 Jan 28).

The tobacco epidemic is affecting mainly developing countries since 84% of world's smokers live in these countries. In low-income countries, nearly half of all men smoke daily and this trend seem to be increasing (World Bank. Economics of tobacco control. Available from: http://www.worldbank.org/tobacco/, updated 2013 Dec 18, cited 2013 Dec 20). Research has proved that secondhand smoke produces the same effect as first hand smoke including cardiovascular disease, lung cancer, and lung ailments such bronchitis and asthma attacks.[1] Smoking related mortality and morbidity can be prevented by reducing smoking prevalence.

In India, Tobacco consumption continues to grow at 2-3% per annum.[2] People in India consume smoking and smokeless tobacco in the form of cigarettes, non-cigarette items such as hand-rolled beedis, chewing paan etc.[3] The prevalence of tobacco use among males has been high in all parts of India. The tobacco consumption is more in rural than in urban areas. In 2003, The Central Government passed 'The Cigarettes and Other Tobacco Products Act' (COTPA) applicable to all tobacco products.[4] But still, the prevalence of tobacco is a huge public health problem.

Methods

A cross-sectional study was performed among adult males aged 18 years and above in Vadagarai village in Thiruvallur district of Tamil Nadu.

The sample size was calculated on the basis of 35% prevalence rate of smoking in rural area according to NFHS-3 survey with an allowable error of 10%, the sample size came to 714.[5] Vadagarai health sub center was chosen randomly from Naravarikuppam Block Primary Health Centre. In order to get 714 men aged 18 years and above, it was decided to survey 445 households in Vadagarai sub-center, with a total of 1581 households with population of 2539 men above 18 years. The households were sampled by systematic random sampling.

Respondents were interviewed using semi-structured questionnaire. The questionnaire for this study was developed based on Global Adult Tobacco Survey (Global Adult Tobacco Survey (GATS), Core Questionnaire with Optional Questions. Available from: http://www.who.int/tobacco/surveillance/guide/en/, updated 2013, cited 2013 Dec 13). It was translated into local language, pretested and standardized. It consisted of two parts of which Part I consists of questions related to socio-demographic profile and part II consist of questions regarding usage of smoking as well as smokeless tobacco.

Data entry was made in MS Office Excel software in codes and analysis was done by SPSS software®. Descriptive statistical

Submission: Nov. 14, 2013
Acceptance: Jan. 29, 2014
Process: Peer-reviewed

[1] Shri Sathya Sai Medical College & Research Institute,Thiruporur,Tamilnadu, India

Correspondence:
Kalaivani A
Address: Shri Sathya Sai Medical College & Research Institute, Ammapettai village-603108, Thiruporur, Kancheepuram district, Tamil Nadu, India.
Email: kalaimedicos11@gmail.com

Table 1: Socio-demographic determinants of tobacco use (n=714)

Socio-demographic variables	Total N=714 (% [95% CI])	Smoker N=262 (%)	Non-Smoker N=452 (%)	p value
Age				
18-30	357 (50.0% [46.33-53.67])	123 (34.45%)	234 (65.55%)	
31-40	112 (15.68% [13.01-18.35])	34 (30.36%)	78 (69.64%)	
41-50	123 (17.2% [14.43-19.97])	46 (37.4%)	77 (62.6%)	0.03
51-60	93 (13.02% [10.55-15.49])	43 (46.24%)	50 (53.76%)	
More than 60	29 (4.1% [2.65-5.55])	16 (55.2%)	13 (44.8%)	
Marital status				
Single	251 (35.2% [31.7-38.7])	95 (37.85%)	156 (62.15%)	
Married	415 (58.10% [54.48-61.72])	141 (33.98%)	274 (66.02%)	0.02
Widower/Divorced/separated	48 (6.72% [4.88-8.56])	26 (54.17%)	22 (45.83%)	
Education				
Illiterate	85 (11.91% [9.53-14.29])	42 (49.40%)	43 (50.60%)	0.01
Literate	629 (88.09% [85.71-90.47])	220 (35.00%)	409 (65.00%)	
Occupation				
Unemployed/student	39 (5.46% [3.79-7.1])	8 (20.5%)	31 (79.5%)	
Daily wagers	288 (40.33% [36.73-43.93])	127 (44.1%)	161 (55.9%)	
Monthly wagers	352 (49.3% [45.63-52.97])	118 (33.52%)	234 (66.48%)	0.002
Semiprofessional/Professional	13 (1.82% [0.84-2.8])	1 (7.7%)	12 (92.3%)	
Retired/old age dependent	22 (3.08% [1.81-4.35])	8 (36.4%)	14 (63.6%)	
Socio-economic status[18]				
3653 and above(Class-I)	13 (1.82% [0.84-2.8])	6 (46.2%)	7 (53.8%)	
1827 -3652(Class-II)	87 (12.18% [9.78-14.58])	26 (29.9%)	61 (70.1%)	
1096-1826(Class-III)	160 (22.4% [19.34-25.46])	53 (33.1%)	107 (66.9%)	0.38
548-1095(Class-IV)	350 (49.01% [43.34-52.68])	137 (39.1%)	213 (60.9%)	
<547(Class-V)	104 (14.56% [11.97-17.15])	40 (38.5%)	64 (61.5%)	

analysis, which included frequency, mean and percentages, was used to characterize the data. 95% Confidence Intervals (95% CI) were calculated. Association with the factors was tested for significance using chi-square test and p <0.05 was considered statistically significant.

Results

The mean age of the sample population was 35.34 years ± 13.98 with range of 18 – 85 years. Half of them were between 18-30 years. Most of them were Hindus (82.5%). Literacy rate of the sample population seems to be high (88.09%). 49.01% of the participants were from upper-middle class socio-economic group and 76.05% were unskilled, semi-skilled and skilled laborers. ***(Table 1)***

Smoking status was found to be statistically significant with age, marital status, education and occupation. But it was not found to be significantly associated with socio-economic status ***(Table 1)***.

Table 2 depicts the prevalence of smoking in men in the study population (95% CI = 33.2 to 40.4), 36.7% of the study group were current smokers. Among smokers the majority of them were using cigarettes (64.5%) (95%CI=58.71 to 70.29) and 24% (95%CI= 18.83 to 29.17) were using beedi. 2.7% were ex-smokers and 60.6% were non smokers. Analysis of the use of smokeless tobacco shows 28.4% (95%CI=25.09 to 31.71) of the study population(n = 714) use smokeless tobacco products. Combined users of both smoking and smokeless tobacco totaled 33(12.6%) (95%CI= 10.17 to 15.03) among the study population.

Analysis of the number of smoking days in the past 30 days shows that the majority of the smoking population (80.2%) (95%CI= 76.16 to 85.68) were smoking for more than two thirds of the months. The mean duration of smoking was 15.93 years and the mean number of cigarettes or beedis smoked per day was 8.5 among smokers ***(Table 2)***.

Discussion

Of the study population of 714 men aged 18 years and above in Vadagarai village of Thiruvallur district, Tamil Nadu, the prevalence of smoking was 36.7%. Similar findings were obtained from NFHS – 3 and Kaur P., et al.[5,6] But it was found to be lower than the findings from Vivek Gupta et al where it was 47.9% and higher than Rani M et al, and Daniel AB et al where it was found to be 29.3% and 17.5% respectively.[7,8,9] The prevalence in our study (36.7%) was found to be higher than in the United States (21.6%-Centers for Disease Control)[10] and lower than in China (52.9%- Harris et al).[11]

Smokeless tobacco users were 28.4% and this was similar to Rani M., et al (28.1%) and higher than that of 6.8% which was reported in Vivek Gupta et al but lower than 36% which was observed from NFHS-3 findings.[5,7,8] Combined users of both smokeless and smoking tobacco were found to be 12.6% in the current study. This was higher than that of 2.1% reported from Vivek Gupta et al and lower than that of 30% which was

Table 2: Smoking tobacco usage pattern (n-262)

Category	Frequencies N=262 (% [95% CI])
Type of smoking	
Cigarette usage	169 (64.5% [58.71-70.29])
Beedi usage	63 (24.0% [18.83-29.17])
Both cigarette and beedi	30 (11.5% [7.64-15.36])
Number of Days of smoking in the past Month	
≤ 10 days	19 (7.25% [4.11-10.39])
11-20 days	31 (11.83% [7.92-15.74])
21-30 days	212 (80.92% [76.16-85.68])
Duration of smoking	
≤ 1 year	23 (8.8% [5.37-12.23])
2-10 years	98 (37.4% [31.54-43.26])
11-20 years	52 (19.8% [14.97-24.63])
21-30 years	47 (18.0% [13.35-22.65])
31-40 years	22 (8.4% [5.04-11.76])
41 years and above	20 (7.6% [4.39-10.81])
Number of cigarettes or beedis used per day	
≤ 1	81 (31.0% [25.4-36.6])
2-5	53 (20.2% [15.34-25.06])
6-10	53 (20.2% [15.34-25.06])
11-20	32 (12.2% [8.24-16.16])
≥ 21	43 (16.4% [11.92-20.88])

observed from Rani M., et al.[7,8]

In the current study, prevalence of smoking was 36.7% and among them 80.92% were smoking for more than two thirds of the month. This was similar to findings from Harris et al. This shows the depth of the problem. Around 64.5% were using cigarettes and 24.0% were using beedi. This was in contrast with Chaudhry K et al report that beedi usage is more common that cigarette smoking in rural areas.[12]

According to Rani M et al, tobacco usage increases with increasing age.[8] In our study population there was a biphasic trend in smoking pattern i.e., the prevalence of smoking was 34.45% between 18-30 years, decreased with 30.36% in between 31-40 years and increased to 55.2% for those with more than 60 years of age i.e., prevalence was more among younger and older age groups.

Prevalence of smoking was more common in illiterates than well-educated. This report was similar to the findings from NFHS-3, Rani M et al, Harris et al and Narayan et al.,[5,8,11,13] In our study population there was no significant association between smoking and socioeconomic status. Smoking status was found to be significantly associated with age group, education, marital status and occupation. But beedi usage was more common in lower socio economic people. Similar findings were seen in the study conducted by Ram B singh et al.[14]

Conclusion

The study concludes that the prevalence of smoking was higher than the Indian national average. Therefore, preventive steps like lifestyle modifications, communication, fiscal measures and further more strong enforcement of the COTPA act 2003 will be needed to decrease the prevalence further.

References

1. U.S. Department of Health and Human Services. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.
2. Tarveen Jandoo, Ravi M. Tobacco Control in India: Present Scenario and Challenges Ahead. Asian Pac J Cancer Prev. 2008;9(4):805-10.
3. Bhonsle RB, Murti PR, Gupta PC. Tobacco habits in India. In: Gupta PC, Hamner J III, Murti P (eds). Control of tobacco-related cancers and other diseases. Proceedings of an International Symposium, 15.19 January 1990; Mumbai: TIFR, Oxford University Press; 1992:25.46.
4. Government of India. The Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply and Distribution) Act, 2003, and rules framed there under.
5. International Institute for Population Sciences (IIPS) and Macro International. 2007. National Family Health Survey (NFHS-3), 2005–06: India: Volume I.
6. Kaur P, Rao SR, Radhakrishnan E, Ramachandran R, Venkatachalam R, Gupte MD. High prevalence of tobacco use, alcohol use and overweight in a rural population of Tamil Nadu, India. J Postgrad Med. 2011; 57(1):9-15
7. Vivek Gupta, Kapil Yadav, Anand K. Patterns of tobacco use across Rural, Urban, and Urban-Slum Populations in a North Indian Community. Indian J Community Med. 2010;35(2):245–51.
8. Rani M, Bonu S, Jha P, Nguyen SN, Jamjoum L. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. Tob Control. 2003;12(4):1-8
9. Daniel AB, Nagaraj K, Kamath R. Prevalence and determinants of tobacco use in a highly literate rural community in southern India. Natl Med J India. 2008;21(4):163-5.
10. Centers for Disease Control, current cigarette smoking among adults—United States, 2011. MMWR. 2012;61:889–94.
11. Harris M, Buerhaus P, Needleman J. Prevalence of Smoking in China in 2010. N Engl J Med. 2011:364(25):2469-70.
12. Chaudhry K, Prabhakar AK, Prabhakaran PS, Prasad A, Singh K, Singh A. Prevalence of tobacco use in Karnataka and Uttar Pradesh in India. Final report of the study by the Indian Council of Medical Research and the WHO South East Asian Regional Office, New Delhi; 2001.
13. Narayan K.M, Chadha, R. L. Hanson, R. Tandon, S. Shekhawat, R. J. Fernandes, and N. Gopinath. Prevalence and patterns of smoking in Delhi: cross sectional study. BMJ. 1996;312(7046):1576-9
14. Ram B Singh Surendra Singh, Pronobesh Chattopadhya, Kalpana Singh, Vijender Singh, Shallendra K Kulshrestha et al. Tobacco consumption in relation to causes of death in an urban population of north India. Int J Chron Obstruct Pulmon Dis. 2007;2(2):177–85.
15. Suryakantha AH. Demography. Community Medicine with recent advances. 2nd edition. Bengaluru, India: Jaypee Brothers Medical Publishers(P) Ltd; 2010.p.591.

Acknowledgments
I sincerely thank Prof. Dr. Ilango, Director, Dr. Nagarani, Associate professor and Dr. Anantharaman, Assistant Professor, Institute of Community medicine, Madras Medical College for their guidance and support.

Conflict of Interest Statement & Funding
The authors have no funding, financial relationships or conflicts of interest to disclose.

Cite as:
Annadurai K, Mani G, Dhanasekaran R. Tobacco Usage among Males in Rural Tamil Nadu, India: A Cross-sectional Study. Int J Med Students. 2014;2(1):18-21.

IJMS International Journal of Medical Students

Case Report

Postoperative and Postpartum Onset of Chronic Parkinsonism: Four Case Reports

Manish Ramani B.,[1] Marcie Rabin L.,[1] Roger Kurlan.[1]

Abstract

Background: Certain environmental exposures have been linked to the development of parkinsonism. We report four cases in which the onset of chronic parkinsonism occurred immediately or soon after surgery or childbirth. **Results:** Exposure to certain anesthetic agents in susceptible individuals or the physiological changes associated with surgery or childbirth may have contributed to or precipitated the development of parkinsonism. **Conclusion:** Clinicians should be aware that postoperative or postpartum settings are potential precipitants of chronic parkinsonism. More research is needed to clarify contributing factors.

Keywords: Parkinsonian disorders, Postoperative period, Postpartum period, Parkinson's disease secondary, Anesthesia (Source: MeSH, NLM).

About the Author: *Dr. Manish Ramani is a graduate of St. George's University School of Medicine, Grenada, West Indies, Boston University School of Medicine in Boston, Massachusetts and Rutgers, The State University of New Jersey in New Brunswick, New Jersey. He is a recipient of the Ruth and William Silen, M.D. Honorable Mention Award taking 4th Place out of 120 presenters for the best presentation of their poster at The New England Science Symposium at Harvard Medical School.*

Introduction

For most patients with Parkinson's disease (PD) and related parkinsonian conditions the underlying etiology is unknown. We now report four cases of parkinsonism observed between 2010 and 2012 during the postoperative or postpartum period that raises important questions about possible precipitating factors, particularly, recently administered anesthesia. None of the four patients had a family history of PD or other parkinsonian like disorders or a known exposure to an identified environmental risk factor for PD. Moreover, in neither case did the patient receive dopamine blocking drugs during anesthesia or for nausea postoperatively.

The Cases

Case 1. A 43-year-old woman, with no significant past medical history, underwent a surgical replacement of her right hip due to osteoarthritic degeneration. The procedure was performed under spinal anesthesia. The anesthetic agent used is unknown. There were no initial complications, but three days postoperatively she noted the onset of a mild intermittent resting tremor of both legs and constipation. Six months after the onset of symptoms, she was referred to our movement disorder clinic for evaluation and found to have hypomimia, hypophonia, mild resting tremor of both legs, greater on the right, bilateral rigidity, also greater on the right leg, and moderate generalized bradykinesia. She had a slow shuffling gait with decreased right arm swing. Retropulsion was present on pull test. Magnetic resonance imaging (MRI) of the brain was normal. She was diagnosed as having PD and treated with selegiline 5mg/day and amantadine 100mg/day which improved her symptoms. Over a period of 2 years her symptoms slowly progressed, but responded well to the addition of carbidopa/levodopa (300mg/day).

Case 2. A 52-year-old woman, with no past medical history, underwent left brachioplasty surgery under general anesthesia without complication. Agents used during anesthesia included desflurane, propofol, lidocaine, fentanyl, midazolam and rocuronium bromide. Approximately one week after surgery, she developed resting tremor in the left hand. She was evaluated three months later in our clinic and found to have mild resting tremor of the left hand, mild rigidity of the left arm and leg, and slight rigidity of the right arm and leg. Finger taps were slow on the left. She had mild generalized bradykinesia. Her gait was normal except for decreased left arm swing. DaTscan showed that radioligand uptake was nearly absent in the right putamen and mildly reduced in the right caudate and left putamen, suggestive of PD. Her symptoms responded well to treatment with carbidopa/levodopa (300mg/day). Her course has been slowly progressive but responsive to dopaminergic medication over an observation period of 3 years.

Case 3. A 62-year-old man with hepatitis C-associated hepatic failure underwent a liver transplantation under general anesthesia without complications. No information about the anesthetic agents used is available. Upon awakening from surgery, he was found to have dysarthria, micrographia, mild rigidity, and decreased dexterity in his right upper extremity without a tremor, leading to a diagnosis of parkinsonism. Over the next eleven years, his symptoms were well controlled with gradually increasing doses of carbidopa/levodopa/entacapone and pramipexole. At this time he presented to our clinic with painful

Submission: Dec. 7, 2013
Acceptance: Jan. 18, 2014
Process: Peer-reviewed

[1]Movement Disorders Program, Atlantic Neuroscience Institute, Overlook Medical Center, Summit, NJ 07901

Correspondence:
Manish B Ramani
Address: Movement Disorders Program, Atlantic Neuroscience Institute, Overlook Medical Center, Summit, NJ 07901
Email: Manish.B.Ramani@gmail.com

dystonic dyskinesias involving his feet, neck, shoulders and back, and wearing off motor fluctuations. These symptoms improved following adjustments of medication doses, timing, and physical therapy.

Case 4. A 36-year-old pregnant woman with no past medical history received epidural anesthesia with bupivacaine 0.0625% at the time of vaginal delivery of her second child. This was poorly tolerated and produced a sensation of whole-body numbness. About 8 weeks after delivery, she developed an action tremor of her right foot when crossing her legs. Over time, she developed tremor of her head, arms and trunk, micrographia and a slow, unsteady and shuffling gait. On physical examination, she had tremor of the head, mild postural and intention tremors of the right hand, mild bilateral rigidity (right greater than left) and dragging of the right leg with decreased bilateral arm swing when walking. Both MRI and fluorodopa PET scanning of the brain were normal. Over the next three years, she experienced progressive parkinsonism that has responded well to carbidopa/levodopa therapy (300mg/day).

Discussion

In each of the four cases, the patient developed persistent parkinsonism following surgery or childbirth with concomitant exposure to anesthetic agents either during general or spinal anesthesia. Unfortunately in two of the cases, despite our efforts, we were unable to obtain documentation of the specific anesthetic agents administered. Two of the patients had an atypical parkinsonian feature of mainly action tremor or no tremor. In one case, functional imaging demonstrated evidence of striatal dysfunction characteristic of PD and in another functional neuroimaging was normal. The two other patients did not undergo functional neuroimaging.

There has been a prior case report of a patient who presented with acute parkinsonism and dystonia during emergence from general anesthesia.[1] About 18 months later typical features of PD appeared. Postoperative generalized rigidity can occur as part of anesthetic-induced malignant hyperthermia and it can develop in an isolated fashion after the administration of drugs used in anesthesia, including fentanyl, sufentanil, and droperidol.[1-4] There are also reports of postoperative rigidity occurring in patients known to have PD, especially after the administration of fentanyl and droperidol.[1, 3-5] Exposure to the induction agent thiopental and the inhalational anesthetics halothane and isoflurane in animals has been associated with impaired release and transport of dopamine by synaptosomes, [6, 7] effects that might induce parkinsonian features in patients. None of these drug effects, however, would be expected to induce long lasting parkinsonism as seen in our cases.[8] An additional report of the appearance of parkinsonism in a pregnant woman exists.[9] In this patient, onset was during the eleventh week of gestation and the parkinsonism resolved completely after spontaneous abortion. Women with PD have been reported to experience a worsening of symptoms during pregnancy.[10]

The mechanisms by which surgery, childbirth, or exposure to anesthesia might induce persistent parkinsonism are unclear. It is possible that certain anesthetic agents might induce neurotoxicity in susceptible individuals and this is a concern that deserves further attention. According to one paper, sevoflurane, a commonly used anesthetic, causes apoptosis and accumulation of beta-site amyloid precursor protein-cleaving enzyme and beta amyloid in vitro and in vivo, possibly promoting Alzheimer disease neuropathogenesis.[11] A similar mechanism could occur with the development of a parkinsonism condition. Another possible mechanism is the autoantibody-mediated neurotoxicity due to stress, such as the Lupus anticoagulant found in four patients who developed Parkinson's disease post surgery.[12] Stress secondary to surgery could bring about a condition that promotes neurotoxicity to the dopaminergic neurons. More likely, however, it appears that anesthetic agents or perhaps the stress associated with surgery or childbirth can precipitate clinical expression of an underlying parkinsonian condition that would have otherwise appeared later. It is also possible that subtle, unrecorded physiological changes that can occur during surgery or childbirth, such as anemia, hypotension, anoxia, or immune responses, may have played a role. Finally, the onset of parkinsonism in the setting of surgery or childbirth could have occurred by chance alone, but the close temporal association would be against this possibility.

Conclusion

In conclusion, each of these four patients developed new-onset parkinsonism without any family history or known environmental exposure. Given the sudden initiation of symptoms in the postoperative or postpartum periods following the administration of an anesthetic, it is prudent for clinicians to be cognizant of these settings as potential precipitants of chronic parkinsonism. Further research is needed to elucidate the factors contributing to this phenomenon, such as a large scale prospective evaluation.

References

1. Muravchick S, Smith DS. Parkinsonian symptoms during emergence from general anesthesia. Anesthesiology. 1995;82(1):305-7.

2. Janis KM. Acute rigidity with small intravenous dose of Innovar. A case report. Anesth Analg. 1972;51(3):375-6.

3. Goldberg M, Ishak S, Garcia C, McKenna J. Postoperative rigidity following sufentanil administration. Anesthesiology. 1985;63(2):199-201.

4. Klausner JM, Caspi J, Lelcuk S, Khazam A, Marin G, Hechtman HB, et al. Delayed muscular rigidity and respiratory depression following fentanyl anesthesia. Arch Surg. 1988;123(1):66-7.

5. Easdown LJ, Tessler MJ, Minuk J. Upper airway involvement in Parkinson's disease resulting in postoperative respiratory failure. Can J Anaesth. 1995;42(4):344-7.

6. el-Maghrabi EA, Eckenhoff RG. Inhibition of dopamine transport in rat brain synaptosomes by volatile anesthetics. Anesthesiology. 1993;78(4):750-6.

7. Mantz J, Varlet C, Lecharny JB, Henzel D, Lenot P, Desmonts JM. Effects of volatile anesthetics, thiopental, and ketamine on spontaneous and depolarization-evoked dopamine release from striatal synaptosomes in the rat. Anesthesiology. 1994;80(2):352-63.

8. Nicholson G, Pereira AC, Hall GM. Parkinson's disease and anaesthesia. Br J Anaesth. 2002;89(6):904-16.

9. Demirkiran M, Aslan K, Bicakci S, Bozdemir H, Ozeren A. Transient parkinsonism: induced by progesterone or pregnancy? Mov Disord. 2004;19(11):1382-4.

10. Kranick SM, Mowry EM, Colcher A, Horn S, Golbe LI. Movement disorders and pregnancy: a review of the literature. Mov Disord. 2010;25(6):665-71.

11. Dong Y, Zhang G, Zhang B, Moir RD, Xia W, Marcantonio ER, et al. The common inhalational anesthetic sevoflurane induces apoptosis and increases beta-amyloid protein levels. Arch Neurol. 2009;66(5):620-31.

12. Chen WH, Lin HS, Kao YF, Lan MY, Liu JS. Postoperative parkinsonism and lupus anticoagulant: a model of autoantibody-mediated neurotoxicity in stress. Brain Inj. 2007;21(5):539-43.

Acknowledgments

I would like to acknowledge Ayan Sanyal, M.D. a 2nd year resident in Family Medicine at the NEOMED/ Western Reserve Health Education program of Northside Medical Center for his help in completing the final steps of this project.

Conflict of Interest Statement & Funding

Dr. Ramani has no outside support and reports no conflicts.
Dr. Kurlan received research support from Otsuka Pharmaceutical Company, LTD, Psyadon Pharmaceuticals, and Rhythm Pharmaceuticals. He is a consultant for AstraZeneca, PLC. He is also on the speaker's bureau for Teva Pharmaceuticals and UCB Pharma. No conflicts are reported.
Dr. Rabin received research support from Ipsen Pharma. She is on the speaker's bureau for Teva Pharmaceuticals.

Cite as:

Ramani M, Rabin M, Kurlan R. Postoperative and Postpartum Onset of Chronic Parkinsonism: Four Case Reports. Int J Med Students. 2014;2(1):22-4.

Cardionephrology: A Widespread Discipline for 21th Century Medical Students and Young Nephrology Residents

Rodolfo F. Rivera,[1] Fulvio Floccari,[2] Germán Diaz Parodi,[3] Luca Di Lullo.[4]

About the Author: *Rodolfo F. Rivera is a graduate physician currently doing the first year of internship in Medical Statistics at the Pavia University, Italy. He is also the organizer of the Training Program in Cardiovascular Disease of the Society of Nephrology for medical students and residents.*

The Experience

Heart and kidney diseases are closely related and the term "cardio - renal syndrome" is adopted worldwide to underline that linkage. Richard Bright recognized that "hypertrophy of the heart seems in some degree to have kept pace with the advance of the disease in the kidneys"[1] and, after him, George Johnson[2], William Gull, Henry Sutton[3], Franz Volhard, Theodor Fahr[4], and Henry Goldblatt[5] confirmed Bright's hypothesis. In 1956, Gabriele Monasterio et al[6], the Pisa School of Medicine introduced the term "Renal Cardiopathy"[7]. Further meetings, such as Strasburg[8], Giessen[9] and especially Assisi Cardionephrology meeting, have emphasized this relationship, after 25 years of experience largely thanks to Professor Timio.[10] On the other hand, the Advanced Dialysis Quality Initiative, led by Prof. Claudio Ronco from Vicenza (Italy), has contributed greatly to the definition and classification of the "Cardio-Renal Syndromes".[11]

The Italian Context of Cardionephrology

The Italian Society of Nephrology (SIN) has recently approved (April 2012) the foundation of the Cardionephrology Study Group (CN-SG) directed by Dr. Luca Di Lullo together with Dr. Antonio De Pascalis (secretary) and other four advisers (Dr. Emiliana Ferramosca, Dr. Antonio Bellasi, Dr. Rodolfo F. Rivera and Prof. Mario Timio), ***(figure 1)***. SIN has commissioned them to discuss and achieve specific clinical, scientific (national meetings) and educational goals (residential stages in cardiovascular diagnosis) in cardio-renal medicine, engaging medical students and nephrology residents.

New Formative Runs for Students and Young Doctors

On April 4th and 5th, 2013, the first annual meeting of CN-SG took place near Rome, in the presence of outstanding speakers (both cardiologists and nephrologists) and over 150 delegates. Scientific sessions have focused on coronary artery disease and chronic heart failure, vascular and cardiac calcifications, Fabry disease and amyloidosis, resistant hypertension and other new insights in cardio - renal diseases.

CN-SG is also involved in planning several research protocols; at the present time, more than 400 patients were enrolled in three clinical studies. This research activity has an increasing participation of students and the consequent production of new graduation thesis. During the last two years, several papers were published in national[12,13] and international[14,15,18] journals.

Figure 1. Cardionephrology Study Group of the Italian Society of Nephrology. (First line from left to right: Antonio De Pascalis, Emiliana Ferramosca, and Mario Timio; second line from left to right: Rodolfo F. Rivera, Antonio Bellasi and Luca Di Lullo).

CN-SG has also promoted close collaborations with cardiologists to provide further research opportunities for both medical students and residents in nephrology and cardiology, interested in cardiovascular medicine.

In May 2013, CN-SG was invited to the Italian Cardiovascular Ultrasound Society (SIEC) annual meeting to collect a symposium about cardio - renal interactions and ultrasound diagnostic tools. From this opportunity the group has presented preliminary data about right ventricular dysfunction in chronic kidney disease patients.[16] Therefore, CN-SG was also invited by the European Cardionephrology Association (ECNA) to take part on 1st Southeastern Europe Cardionephrology and Hypertension

Submission: Sep. 17, 2013
Acceptance: Dec. 31, 2014

[1]Nephrology Division, San Gerardo Hospital, University of Milan-Biccoca, Monza, Italy
[2]Department of Nephrology and Dialysis, San Paolo Hospital, Civitavecchia, Italy
[3]Department of Medicine, Iturraspe Hospital, University of Litoral, Santa Fe, Argentina
[4]Department of Nephrology and Dialysis, L. Parodi Delfino Hospital, Colleferro, Italy

Correspondence:
Rodolfo F. Rivera
Address: Via Pergolesi 33, 20050 Monza (MB), Clinica Nefrologica, A.O. Ospedale San Gerardo.
Email: rodolfofrivera@gmail.com

Congress in Nis (Serbia) in a round table on right ventricular failure and chronic kidney disease (CKD).[17]

Research Opportunities for Undergraduates and Graduate Levels

Together with study group constitution, the Italian Society of Nephrology council has approved three multicentric research protocols proposed by CN-SG for the next three years. The first one is related to the evaluation of incidence and prevalence of right ventricular dysfunction in Stage III - IV CKD patients. Actually, more than 400 patients were enrolled and preliminary data were available.[18] The second one concerns the predictive value of bioimpedance analysis in patients with chronic heart failure and chronic kidney disease; the study is currently in the enrolling stage. The last one is focused on evaluating cardiovascular assessment (especially incidence and prevalence of pericardial effusion) in patients with familial polycystic kidney disease. This study has a case-control design with 220 patients and more than 300 controls currently enrolled.

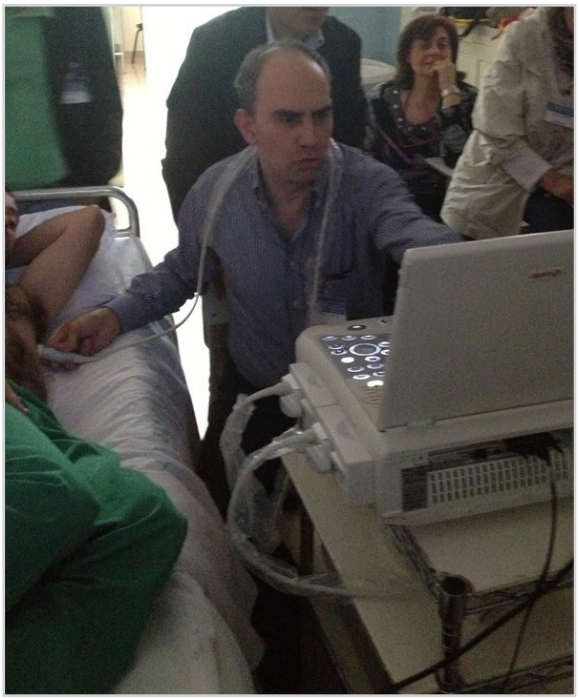
Figure 2. Dr. P. Poleggi during the training on Basic Life Support- Defibrillation (BLS-D).

The three ongoing research protocols are giving a great opportunity to several students to be involved in research at an undergraduate level.

New Clinical Stages and Fellowship

On the educational front, CN-SG provided "residential stages" for all medical students and nephrology residents required to be confident with diagnostic approach to cardiovascular disease. The educational program includes practical sessions on electrocardiography and echocardiography diagnostic devices

Figure 3. Dr. L. Di Lullo during an echocardiographic practical exercise.



together with complete training on Basic Life Support- Defibrillation (BLS-D) ***(figure 2)***. All tutors are certified by respected scientific societies such as SIEC ***(figure 3)***. New dates are planned in 2013 and 2014.

CN-SG has recently also involved in educational training of Italian post-graduate schools of Nephrology by setting up seminars of Cardionephrology for medical students and residents. Students coming from the Internal Medicine Division of Iturraspe Hospital in Santa Fe, Argentina (Litoral National University) performed three months of clinical stages at the Nephrology division in San Gerardo Hospital, Monza, Italy (Milano-Bicocca University), a helpful experience to share different ways of managing daily nephrology practice.

All CN-SG activities, courses, downloadable material and other news are available on the internet (http://www.sin-cardionefrologia.it/).

References

1. Bright, Richard. Tabular view of the morbid appearances in 100 cases connected with albuminous urine. Guy's Hospital Reports 1836; 1:380.
2. Johnson, G. On the disease of the Kidney. John Park Son Lond. 1852; 131.
3. Gull WW. On the Pathology of the Morbid State Commonly Called Chronic Bright's Disease with Contracted Kidney... Medico-Chir Trans Garrison Morton. 1872; 37:4215.
4. Volhard F, Fahr, T. Die Brightscht Nierekrankheit. Klinik, Pathologie und Atlas. Springer, Berlin. 1914; 115–43.
5. Goldblatt H, Lynch J, Hanzal RF, Summerville WW. Studies on experimental hypertension: I. The production of persistent elevation of blood pressure by means of renal ischemia. J Exp Med. 28 febbraio 1934; 59(3):347–79.
6. Timio M. XIII Congresso Societa' Italiana di Cardiologia 1956, in Trieste and the birth of cardionephrology. G Ital Nefrol. 2007; 24(6):600–4.
7. Monasterio G, Gigli G, Donato L, Muiesan, G. La Cardiopatia Renale. Atti Soc Ital Cardiol. 1956; XVIII Congresso, Trieste:7–56.
8. Jahn H, Massry S, Ritz E, Weidmann P. Cardiocirculatory Function in Renal Disease. Basel: S Karger Ag; 1984.
9. Wizemann V, Kramer W, Schütterle G. The heart in end-stage renal failure: etiology, symptoms, and management of uremic heart disease. Basel: Karger; 1986.
10. Timio M, Venanzi S. Cuore e rene. Abetre Edizioni. Milano; 1987.
11. Ronco C, Haapio M, House AA, Anavekar N, Bellomo R. Cardiorenal syndrome. J Am Coll Cardiol. 2008; 52(19):1527–39.
12. Rivera R, Floccari F, Di Lullo L, Granata A, Logias F, D'Amelio A, et al. La malattia renale cronica e il trattamento dello scompenso cardiaco, il ruolo del cardionefrologo. Tecniche Nefrologiche e Dialitiche. 2012;1(24):82-94.
13. Bellasi A, De Pascalis A, Di Lullo L, Ferramosca E, Rivera R, Timio M. GdS di Cardionefrologia: attualità e prospettive future. G Ital Nefrol. 2013. 30 (2):1-3.
14. Di Lullo L, Floccari F, Santoboni A, Barbera V, Rivera RF, Granata A, Morrone L, Russo D. Progression of cardiac valve calcification and decline of renal function in CKD patients. J Nephrol. 2013;12;26(4):739-44.
15. Di Lullo L , Floccari F, Rivera R, Barbera V, Granata A, Otranto G, Mudoni A, Malaguti M, Santoboni A, Ronco C. Pulmonary Hypertension and Right Heart Failure in Chronic Kidney Disease: New Challenge for 21st-Century Cardionephrologists. Cardiorenal Med. 2013;3:96-103.
16. ECOCARDIOGRAFIA 2013. XVI Congresso Nazionale, Società Italiana di Ecografia Cardiovascolare (SIEC). Available at: http://www.siec.it/congresso/index.php
17. KARNEF 2013. 1st Southeastern Europe Cardionephrology and Hypertension Congress. Available at: http://www.karnef.org/cms/index.php/en/
18. Floccari F, Granata A, Rivera R, Marrocco F, Santoboni A, Malaguti M, et al. Echocardiography and right ventricular function in NKF stage III chronic kidney disease: Ultrasound nephrologists' role. J Ultrasound. 2012;15(4):252–6.

Acknowledgments
None

Conflict of Interest Statement & Funding
The authors have no funding, financial relationships or conflicts of interest to disclose.

Cite as:
Rivera RF, Floccari F, Diaz-Parodi G, Di Lullo L. Cardionephrology: A Widespread Discipline for 21th Century Medical Students and Young Nephrology Residents. Int J Med Students. 2014;2(1): 25-7.

IJMS International Journal of Medical Students

The Procedure

David Mathew.[1]

About the Author: *David has just completed his medical studies at Monash University (Melbourne). He will be returning to Singapore to further his medical career as a doctor. He is keenly interested in both Internal Medicine and Anaesthesia. In addition, he enjoys partaking in the teaching of junior medical students.*

He was an elderly gentleman who presented to the hospital because of dysphagia and marked weight loss.

Numerous investigations revealed no answers; there was no explanation for his symptoms. And now it was time for me to perform a lumbar puncture on him following a suspicion of an autoimmune process, one that the cerebrospinal fluid (CSF) - fluid in his back - could possibly provide answers for.

I approached his bed and he slowly turned to greet me.

"Hi, I'm part of the team, and it looks like we need to do a few more tests to find out what's wrong."

He grimaced at the word "tests". It could not be good news having more tests. But he remained strong and gave me a nod- almost robotic in nature.

"I'll need to do a little injection in your back and take some of the fluid out."

Ordinarily, a needle in the back would terrify someone - but not this gentleman.

He'd had days of consecutive blood tests. His veins were running out, and the number of attempts required to draw blood increased by the day as the size of his vessels shrunk.

"Go on and explain."

It took me a few minutes to comprehend the above line he uttered, due to his severe dysarthria. Only after asking him to write it down did I understand.

And whilst explaining the procedure, I watched his eyes brim with tears - tears that equilibrated so that they just filled his eyes, tears that were never enough to trickle down the creases of his weary cheeks. I enunciated each word, explaining the indications and risks. It was as if each word was a dagger, slicing apart any sinew of confidence left in him.

That day I learned to be strong in the face of hopelessness. That day I learned the power of medicine, a power to break even the sturdiest souls. That day I stared futility in the eye.

Patients are subject to the mercy of medical professionals, ones who would usually unleash a battery of tests to find a cure. Yet sometimes we forget the pain that they have to go through, the agony of being subjected to tests to rid their own bodies of destruction. And the simple solution of time – just spending a little more time with patients – may sometimes be the only solution to allay their fears.

Submission: Oct. 5, 2013
Acceptance: Dec. 31, 2013

Acknowledgments
None

Conflict of Interest Statement & Funding
The authors have no funding, financial relationships or conflicts of interest to disclose.

Cite as:
Mathew D. The Procedure. Int J Med Students. 2014;2(1):28.

[1] Monash University, Melbourne, Australia.

Correspondence:
David Mathew, MBBS(Hons)
Address: 129 Pending Road #05-334, Singapore
Email: davidmat28@hotmail.com

Technology Trends in Medical Education

To the Editor,

On the 9th of November 2013, medical students leaders from across Ireland came together for an inaugural National Medical Student Summit held at the National University of Ireland, Galway. The summit led to the creation and launch of the Association of Medical Students in Ireland (AMSI). Irish medical students will now have an organization that can facilitate dialogue on national and international level. One of the aims of this organization is to create a forum where students can discuss a range of scientific and social topics, specifically how they affect medical students. With this in mind, the 1st annual AMSI summit included a round table discussion on how technological advances have affected medical education. Recurring themes that arose included the effects on patient safety, the lack of reliability of information and finally financial burden of new technology.

Patient Safety

From the very start of clinical education the saying "see one, do one, teach one" can be heard around the hospital ward. For some students it means inserting their first intravenous (IV) cannula, a procedure with relatively minimal risks. However, when you begin to look at this in the graduate setting, you realize that some procedures that carry high risks and complications are sometimes conducted by inexperienced trainees. This may partially be explained by the international propagation of a litigious culture, leading to the inexperienced junior doctor. This has led to the emergence of a new dogma, "See one, simulate many... then do one!".[1] Simulated technology has been shown to assist medical students in making the leap from theoretical knowledge to practical experience.[2] The benefits of simulation technology and other training devices are numerous, however it is imperative to note the increased costs associated with these technologies.

Cost of Medical Education

A large proportion of financial burden associated with new technology is placed on educational institutions. However, we focused our discussion on the financial burden from a student perspective. Some of the cost of technological advancement is transferred to the student due to the increased necessity of smart phones, laptops, online applications and tablets, which are all becoming essential to further clinical teaching.[3] Although these associated costs are currently considered the norm, the introduction of any new technology should be cost-benefit analyzed to prevent any excessive financial burden on medical students. In addition, there should be an appropriate distribution of these costs between students, institutions and the public, which will ultimately benefit from these technologies.

Reliability of Information

In our discussion we also highlighted that technology has allowed for information to be disseminated at alarming speeds, by anyone with an Ethernet cable. While this has obvious advantages such as increasing collaboration between clinicians around the globe, it was also acknowledged that this same quality posed a serious risk if abused.[4] One of the most well known horror stories was when an article by Andrew Wakefield fraudulently suggested a link between the Measles, Mumps, and Rubella (MMR) vaccine and autism.[5] The effects of this technology spreading false data are still being felt.[6] On a smaller scale, participants highlighted the potential hazards of using easily accessible online information. Many students have encountered situations where they have used information from online sources only to find out that they were outdated, misinterpreted or out rightly false. With this in mind, it was suggested that medical schools subscribe to online reliable resources that are easily accessible for their students.

Conclusion

New technologies have led to much advancement in the field of medical education. However, before these are routinely implemented into the curriculum it is vital that they are audited in terms of patient outcomes and cost-benefit. Finally, reliability of information should be highlighted as potential issue as medical educators begin to imbed new technology into the medical curriculum.

Pishoy Gouda,[1,2] *John Campion.*[1,2]
[1]National University of Ireland Galway; Galway; Ireland.
[2]Association of Medical Students in Ireland; Ireland.
p.gouda1@nuigalway.ie

Acknowledgments: Many thanks to all the medical students and individual university societies that made this event possible. It is through their hard work and endless correspondence that has made the creation of the Association of Medical Students in Ireland (AMSI) possible.

Conflict of Interest Statement & Funding: The Authors have no funding, financial relationships or conflicts of interest to disclose.

Cite as: Gouda P, Campion J. Technology Trends in Medical Education. Int J Med Students. 2014;2(1):29.

References

1. Vozenilek J. See One, Do One, Teach One: Advanced Technology in Medical Education. Acad Emerg Med. 2004;11(11):1149–54.
2. Weller JM. Simulation in undergraduate medical education: bridging the gap between theory and practice. Med Educ. 2004;38(1):32–8.
3. Boulos MNK, Wheeler S, Tavares C, Jones R. How smartphones are changing the face of mobile and participatory healthcare: an overview, with example from eCAALYX. Biomed Eng Online. 2011;10(1):24.
4. Boulos M, Maramba I, Wheeler S. Wikis, blogs and podcasts: a new generation of Web-based tools for virtual collaborative clinical practice and education. BMC Med Educ. 2006;6(1):41.
5. Godlee F. The fraud behind the MMR scare. BMJ; 2011;342.
6. Offit PA, Coffin SE. Communicating science to the public: MMR vaccine and autism. Vaccine. 2003;22(1):1–6.

About the Author: *Pishoy Gouda is a 5th year medical student at the National University of Ireland, Galway enrolled in the 6 year program. He is a recipient of the "Have a Heart Bursary" awarded by the Canadian Cardiology Congress as well as a recipient of the Alberta Innovates Health Solutions Summer Studentship award.*

Submission: Nov. 25, 2013
Acceptance: Dec. 31, 2013
Process: Peer-reviewed

Acknowledgement of Reviewers of the International Journal of Medical Students, Vol 1, 2013

Executive Committee of IJMS.

The Executive Committee, Editors and Staff of the International Journal of Medical Students, wish to sincerely thank the following reviewers for their contributions to the Journal and support to medical students worldwide. Your time and expertise are greatly appreciated.

- Alberto Cózar Llistó
- Amit Mehndiratta
- Andrew Harrison
- Barbara Deschler
- Carlos Gustavo Trujillo Ordóñez
- Chirita Emandi Adela
- David Büchser Garcia
- Deepak Mehta
- Erhan Ararat
- Esen K. Akpek
- G. Jahnavi
- Gray Gabriella
- Hugo Lopez
- Kong Then
- Laszlo Littmann
- Linda Ernst
- Lynn Meurs
- Mark Whitman
- Mark Willcox
- Natalia B. Rumie Vittar
- Nihal Atsiz Okan
- Rosário Perry da Câmara
- Shane Tubbs
- Stacy Stratemann Killen
- Sunil Rangarajan
- Suphi Taneri
- Umit Tapan
- Vanitha Ratnalingam
- Virasakdi Chongsuvivatwong
- Yahya Burak Atalay
- Yang Liu
- Yuka Tsukahara
- Zaynab Alourfi