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ORIGINAL ARTICLE

KNOWLEDGE IN STATISTIC AND EPIDEMIOLOGY AMONG MALAYSIAN POSTGRADUATE STUDENTS: IS IT DIFFICULT FOR OUR TRAINEES TO PERFORM ON THE MOCK CRITICAL REVIEW PAPER?

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ABSTRACT

Objective: **Critical appraisal is a process of systematically examining research evidence to assess its validity, results and relevance before using it to form a decision. A basic knowledge in statistic and epidemiology is important among postgraduate students in psychiatry to acquire the skills for appraising clinical research evidence. This is a descriptive study that attempts to look into the level of knowledge among the postgraduate psychiatry students in terms of statistic and epidemiology.** ***Methods:*** **A total of 31 postgraduate students in their second (N= 26) and third year (N=5) Master of Medicine (Psychiatry) and Master of Psychological Medicine from three different universities, namely: Universiti Kebangsaan Malaysia, Universiti Malaya and Universiti Sains Malaysia participated in this research. The participants were asked to answer 7 questions within 30 minutes. The passing mark for this critical review paper is set at 25 out of 50.** ***Results:*** **Overall, only 32.3% passed the mock critical review paper. About 67.7% of the students passed their epidemiology component and only 19.4% passed the statistic component. Conclusion: We found poor performance in basic statistics among psychiatric trainees which highlights the need for further improvement in the subject's training.** ***ASEAN Journal of Psychiatry, Vol.10, No.1, Jan – June 2009: XX.***

Keywords: **Postgraduate psychiatry, critical review, epidemiology & statistics**

Introduction

Critical review paper is an essential part of postgraduate assessment that evaluates the students' ability in using research evidence for their clinical practice. This includes the process of systematically reviewing methods and findings, appraising and acting on evidence of effectiveness. It allows us to make sense of research evidence and thus reduces the gap between research

and practice. In order to determine what the best evidence is, we need critical appraisal skills that will help us understand the method and results used in a research and subsequently assess the quality of the research. No research is perfect, and critical appraisal is not an exact science but it can help us to decide whether a reported piece of research is good enough to be used in decision making. If a research has flaws, it is up to readers to use their critical appraisal skills to decide whether this affects the usefulness of the paper in influencing their decision.

The critical review paper was first introduced into the MRCPsych examination in Spring 1999. It was primarily for educational reasons. The introduction of this paper has been associated with a change in the format of the traditional journal club (1). Many lecturers in psychiatry believe that the more stringent critical style is a good forum for teaching evidence-based medicine skills (1).

As The Conjoint Board for Postgraduate Psychiatry in Malaysia gradually evolved and established in early year 2000, the curriculum for the master in medicine (psychiatry) degree (equivalent to Royal College Psychiatrist (MRCPsych.) was revised accordingly. The critical review paper was later introduced in the Malaysian curriculum for the first time in 2005. The objective of critical review paper is to prepare the trainees in advancing themselves in the current knowledge in psychiatry and keeping abreast with the latest development in the field of medicine in general. It is also hoped to promote the trainees to undertake research activities in psychiatry with critical thinking. The application of the knowledge would help to raise the levels of expertise and practice of mental health services in the society (2). As part of the training, the postgraduate trainees participated in revision courses in postgraduate psychiatry. The objective of the course is to help the postgraduate candidates to refresh their knowledge on basic sciences and psychopathology (3), which includes the subject of critical review in psychiatry.

As critical review paper is a newly introduced paper in the curriculum of postgraduate psychiatry training in Malaysia (2), the authors were interested to know the ability of trainees in psychiatry in answering the paper, which was adopted from the Royal College syllabus. The critical review paper usually consisted of questions testing the trainees' understanding on the research methodology and basic statistical concept as well as examining the candidates' critical thinking e.g. the usefulness of a research in relation to applied psychiatry. The critical review paper might focus on any of the study designs including cross-sectional, prospective, meta-analysis, randomized clinical trials and validation of new psychometric diagnostic tools in psychiatry. It is useful to evaluate the performances of the candidates sitting for this paper to help us identify the areas of strengths and weakness of our trainees in the subject matter. From this, we can further strategize to improve the training in the near future. In relation to this, we chose to study their performance in one of the mock (sample) critical review paper during a revision course.

Methods

This is a descriptive cross-sectional study. Verbal consent was obtained from the students at the early part of the workshop. The data were obtained from the answer sheets of a mock exam paper (see Appendix A) dated 6th April 2007 compared against its model answers. A total of 31 postgraduate students in their second (N= 26) and third year (N=5)Master of Medicine (Psychiatry) and Master of Psychological Medicine from three different universities, namely: Universiti Kebangsaan Malaysia, Universiti Malaya and Universiti Sains Malaysia participated in this research. The participants were asked to answer 7 questions within 30 minutes. The passing mark for this critical review paper is set at 25 out of 50.

Results

The total number of postgraduate students participated in this study is 31. Only 10 students (32.3%) passed the critical review paper. The highest score is 41 and lowest score is 11. The average scores (mean) is 22.9 and median is 20. Majority of the third year students (80%) and only 6 students (23.08%) of the second year students passed the critical review paper.

The questions 1 to 4 which tested on epidemiology (Epid) and questions 5 to 7 which tested on statistical knowledge (Stat) were further analyzed and described in the table 1. Overall the students performed better on epidemiological questions as compared to statistical knowledge questions.

Table 1: Comparison between epidemiological component and statistical component

N = 31	Pass	Fail
Epidemiology Component (Epid)	67.7%	32.3%
Statistic component (Stat)	19.4%	80.6%

Table 2 shows that majority of the students failed in question 5 (80.65%) followed by questions 7 (77.42%) and 6 (64.52%). However most of the students managed to answer question 1 (96.77%).

Table 2: Distributions of passing rate per question

Questions	Pass	Fail
1. Questions on study design	96.77 %	3.23%
2. Questions on sampling method	64.52%	35.48%
3. Questions on sensitivity and specificity	58.06%	41.94%
4. Questions on prevalence	45.16%	54.84%
5. Questions on statistical tools & interpretation of Data	19.35%	80.65%
6.Questions on variables, confounders & statistical Test	35.48%	64.52%
7.Questions on statistical tests	22.58%	77.42%

Discussion

Critical review paper is the ability to judge the persuasiveness of the evidence in a research study. It provides a systematic way of assessing the validity, results and usefulness of published research papers. Several surveys in the 1980s demonstrated that practicing physicians, particularly those with no formal education in biostatistics and epidemiology, had poor understanding of common statistical tests and limited ability to interpret study results (4-6). Many physicians are likely to have increased difficulty today because more complicated statistical methods are being reported in the medical literature (7). They might be able to understand the analysis and interpretation of results in only 21% of research articles (7).

Therefore it is crucial for every psychiatry postgraduate student to have a basic knowledge in the statistic and epidemiology. The critical review paper tests vast areas of knowledge on critical thinking, based on the candidate's knowledge on medical statistic and clinical epidemiology. Unlike viva voce, short notes or MCQ, Critical review paper has the advantages of assessing the breadth and depth of a candidate's knowledge and critical thinking on literature review. Based on the results, about 70% of our postgraduate students answering the Mock Critical Review Paper failed the exam. Majority of the students (80.6%) failed in the statistic component questions. Most of them failed (80.65%) in questions number 5 which asked specifically about statistical tools and interpretation of data. Basic statistics is usually considered a difficult subject during discussion because it is not encountered in the postgraduate student's everyday life (3). It is only discussed during journal club, critical appraisal sessions or as a subject in a formal lecture. The poor knowledge in biostatistics among our postgraduate students from the study results is likely to reflect insufficient training. Some trainees had never received biostatistics teaching at any point in their career. When training did occur, the majority of this took place during their preclinical undergraduate medical education and was not reinforced during working years.

Limitations of this study should be considered. First, our data is based on a

mock Critical Review Paper during a revision course and therefore may not be an accurate reflection of the true second part master in medicine (psychiatry) examination. Second, the mock Critical Review Paper sample were selected and reviewed by only one consultant psychiatrist. Therefore, this also might not reflect the exact questions in final examinations, as the final examinations questions were finalized by more than 10 senior consultant psychiatrists. Third, our study was brief, thus limiting our ability to assess the understanding of all biostatistical concepts and research results. Nonetheless, our questions focused on the most commonly used methods and results found in the contemporary literature. Fourth, the study only included those postgraduate students who were present at the time of the mock exam trial and some of them were only in their second year. Thus students from the second year might not have enough knowledge or experience in critical appraisal while the postgraduate students who did not attend, either by choice or by chance, might have scored differently. Despite these limitations, we would like to highlight that this is the first study in Malaysia on postgraduate psychiatry that looked into the candidates' performance in the knowledge of basic biostatistics and epidemiology among young medical doctors aspiring to become psychiatrists. It is difficult to research the real exam results among trainee psychiatrists, as this would involve confidentiality issues in officialdom, especially involving the three medical faculties of Universiti Kebangsaan Malaysia (UKM), Universiti Sains Malaysia (USM) and Universiti Malaya (UM).

Nowadays, more sophisticated statistical methods are being used in medical literature. However, it is important to note that basic concepts, frequently occurring tests, and interpretation of results are still poorly understood by psychiatrists. If a psychiatrist had difficulties in appraising clinical research evidence, the risk of incorrect interpretation may lead to erroneous clinical applications of research. Medical lecturers and senior psychiatrists should reevaluate the teaching-learning method and reinforced the knowledge in order to adequately prepare trainees for lifelong learning. Further research is also needed to examine the effectiveness of specific educational interventions. Examinations is hoped to drive trainees to learn more about statistics and epidemiology, and generate more interest among the future psychiatrist in appraising psychiatric literature.

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Appendix A: Critical Review Paper Question

6TH APRIL 2007
DEPARTMENT OF PSYCHIATRY, UKM
Please answer ALL questions in 30 minutes

Paper:

THE PREVALENCE OF SEXUAL PAIN DISORDER AND THE POTENTIAL RISK FACTORS THAT MAY BE ASSOCIATED WITH SEXUAL PAIN IN THE MALAYSIAN WOMEN

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SUMMARY

Objective of this research paper is to investigate the prevalence of sexual pain disorder and the potential risk factors that may cause sexual pain in Malaysian women. This study was conducted at one of the government primary health care clinics located in Bandar Tun Razak, a rather busy suburban area of Kuala Lumpur, Malaysia. The respondents are women who attending the particular primary health clinic. It was conducted over a period of four months (March to June 2005). This study used a non-probability sampling (universal sampling) method. ***Inclusion criteria*** *include: (i) female patients; (ii) aged between 18 and 70 years old; (iii) married and have a sexually active partner; (iv) ability to read and understand the study languages (Malay or English); (v) consent for participation in the study.* ***Exclusion criteria*** *include: (i) chronic and severe medical illness/illnesses; (ii) psychiatric illness/illnesses; (iii) pregnancy; (iv) postpartum period of 2 months; (v) inability to read and understand the study languages; (vi) consent refusal to participate in this study. The instruments used in this study were: 1. Sociodemographic and Marital Profile Form; 2. The Malay Version of Female Sexual Function Index (MVFSFI); 3. The Mini International Neuropsychiatric Interview (M.I.N.I.).*

Sociodemographic and Marital Profile Form: *This is a brief questionnaire was devised to obtain respondents' sociodemographic and marital information. It includes name, age, educational level, employment status, monthly family income, medical history, menstrual history, duration of marriage, age of husband, number of children and frequency of sexual intercourse.*

Malay Version of Female Sexual Function Index (MVFSFI) *is a Malay translated version of the Female Sexual Function Index (FSFI) developed by Dr. Raymond Rosen. The original FSFI is a 19-item, multidimensional self-report measure of female sexual functioning. It covers 6 basic domains of female sexual functioning: desire, arousal, lubrication, orgasm, satisfaction, and pain. The reliability test for agreement using Pearson product-moment correlation coefficient (r) ranged from 0.767 to 0.973. The internal consistency using Cronbach's alpha ranged from 0.87 to 0.97. The cut-off score for domain of sexual pain was established at* $\leq$ *7 for sexual pain disorder (sensitivity 86% and specificity 95%). The lower the scores, the more likely the women would suffer from FSD.*

Mini International Neuropsychiatric Interview (M.I.N.I.) *was used to exclude any respondents with psychiatric illness from this study. This is a brief structured interview for major Axis I psychiatric disorders in DSM-IV and ICD-10. It has been shown to have acceptably high validity and reliability when compared with the more lengthy diagnostic instruments as such as the SCID-P and the CIDI. This was administered by one of the authors who was trained to use the instrument. It has been used in local studies and found to have good inter-rater reliability. The inter-rater reliability for this study was ascertained by administering the instrument on 10 cases selected randomly. This was done by two of the authors and yielded a kappa value of 1.The relationship between the studies parameters were analyzed using appropriate statistical tests. Chi-square test (χ^2- tests) were used to determine risk factors for FSD among categorical independent and dependent variables.*

RESULTS

Two hundred and forty eight (248) patients who attended the Bandar Tun Razak primary care clinic, Cheras, Kuala Lumpur were invited to participate in the study. However, 18 patients were unable to complete the study because of multiple reasons such as unable to make time (4 patients), did not feel comfortable with the questions (7 patients) and did not bring their reading glasses to clinic (5 patients). The response rate was 93% with total subjects of 230. Two patients were screened and diagnosed to have anxiety disorder and major depressive disorder respectively by MINI were excluded.

The prevalence of SPD was 67.8% (156/230).

RISK FACTORS FOR WOMEN WITH SEXUAL PAIN DISORDER

The risk factors associated with women suffering from orgasmic dysfunction are shown in table 2.

Table 2. Risk factors associated with women with Sexual Pain Disorder (SPD)

Potential Risk factors	*Variables* *Normal (n = 74)*	*SPD (n= 156)*	χ^2	*p value*
Age				
≤ 45 years old	*61 (37.9%)*	*100 (62.1%)*	*8.0*	*0.005*
> 45 years old	*13 (18.8%)*	*56 (81.2%)*		
Race				
Malays	*63(36.0%)*	*112 (64.0%)*	*4.9*	*0.03*
Non Malays	*11(20.0%)*	*44 (80.0%)*		
Salary (Malaysian Ringgit)				
< 1,875	*36 (31.3%)*	*79 (68.7%)*	*0.08*	*0.78*
≥ 1,875	*38 (33.0%)*	*77 (67.0%)*		
Duration of marriage				
Married less than 14 years	*50(40.3%)*	*74(59.7%)*	*8.2*	*0.004*
Married 14 years or more	*24(22.6%)*	*82(77.4%)*		
Academic status				
Higher academic	*10(18.2%)*	*45(81.8%)*	*5.22*	*0.001*
Lower academic	*64(36.6%)*	*111(63.4%)*		
Husband's age				
Age ≤ 42 years old	*51(41.5%)*	*72(58.5%)*	*10.5*	*0.001*
Age >42 years or more	*23(21.5%)*	*84(78.5%)*		
Number of children				
Women with ≤ 3 children	*51(36.2%)*	*90(63.8%)*	*2.67*	*0.10*
Women with > 3 children	*23(25.8%)*	*66(74.2%)*		
Sexual intercourse				
< 3 per month	*59 (29.6%)*	*140 (70.4%)*	*4.32*	*0.038*
≥ 3 per month	*15 (48.4%)*	*16 (51.6%)*		
Dysmenorrhea				
Yes	*20(30.8%)*	*45 (69.2%)*	*0.82*	*0.76*
No	*54(32.7%)*	*111(67.3%)*		
Menopause				
Yes	*1 (3.0%)*	*32(97.0%)*	*15.00*	*< 0.001*
No	*73(37.1%)*	*124(62.9%)*		

QUESTIONS AND ANSWERS:

1. (a) What kind of study design is this? *(2 marks)*

Cross-sectional study

(b) List 2 advantages and 2 disadvantages of this type of study.

Two advantages: (i) Cheap,
(ii) Easy To conduct/Not time consuming

Two disadvantages: (i) Cannot establish causative factors,
(ii) Not very informative than prospective study.

(4 marks)

2. (a) What kind of sampling method is being used in this study?

Non-probability sampling (universal sampling)

(2 marks)

(b) List 2 other sampling methods that you know.

(i) Cluster sampling,
(ii) Statified sampling

(2 marks)

(c) Briefly outline 2 strengths and 2 weaknesses of the respondents' recruitment (especially looking at the inclusion criteria).

2 strengths (i) high respondent rate (low refusal rate)
(ii) patients with severe physical disorder were excluded

2 weaknesses (i) single sexually active respondent was excluded
(ii) 2 months postpartum period was quite long and may exclude other potential sexual pain

(3 marks)

3. The cut-off score for the sexual pain domain was established at ≤ 7 (sensitivity 86% and specificity 95%)using the MVFSI to detect sexual pain disorder among the respondents.

(a) What are the meaning of sensitivity and specificity of a psychometric tool?

Sensitivity = ability to detect true positive (TP) rate;
Ability of a psychometric tool to detect caseness based on the gold-standard diagnosis
and
Specificity = ability to detect true negative (TN) rate.
Ability of a psychometric tool to detect non-caseness based on the gold-standard diagnosis

(4 marks)

(b) Interpret the meaning of MVFSI in diagnosing sexual pain disorder at 86% and 95% sensitivity and specificity respectively.

The MVFSI was able to detect both 86% and 95% cases and non-cases respectively based on the gold standard diagnostic tools.

(4 marks)

4. In this research, it was found that the prevalence of sexual pain disorder was 67.8%.

(a) What kind of prevalence is this?

Point prevalence

(2 marks)

(b) List 2 types of other prevalences that you know.

1. Period prevalence
2. Lifetime prevalence

(2 marks)

5. (a) χ^2-test was used as a statistical tool. What is the objective of a χ^2-test?

A χ^2-test is a non-parametric test that being used for (i) goodness to fit test and (ii) to find out association between the observed (O) and exposed (E) variables.

(2 marks)

(b) Explain the meaning of the data below,

Compared to women with frequency sexual intercourse (SI) more than 3 times per month, women with SI less than 3 times per month has significant different risk of having sexual pain (70.4% vs. 51.6%) with very significant statistical findings (χ^2= 4.32, $p < 0.05$).

(4 marks)

(c) How are you going to interpret it to your non-medical colleague (in non-scientific term)?

Women with infrequent sexual activity has high risk of having sexual pain.

(2 marks)

Potential Risk factors	*Variables* *Normal (n = 74)*	*SPD (n= 156)*	*χ^2*	*p value*
Sexual intercourse				
< 3 per month	*59 (29.6%)*	*140 (70.4%)*	*4.32*	*0.038*
≥ 3 per month	*15 (48.4%)*	*16 (51.6%)*		

6. (a) *List two dependent variables of this study.*
Sexual pain, No sexual pain

(2 marks)

(b) *List two confounders of this study.*

Age
Race
Salary (Malaysian Ringgit)
Duration of marriage
Academic status
Husband's age
Number of children
Sexual intercourse
Dysmenorrhea
Menopause

(2 marks)

(c) *What kind of statistical test can be used to assess the predictor outcome of the various significant independent variables?*

Logistic regression analysis.

(1 mark)

7. An intervention was conducted and an average of 3 cognitive-behaviour therapy (CBT) sessions were attended by 10 patients with sexual pain while 8 patients did self-reading on how to overcome their sexual problems. Out of 10 patients attending CBT, 8 improved; whereas out of 8 patients who did the self-reading, only 2 improved.

(a) *Draw the 2 x 2 table (status of overall improved/not improved outcome versus intervention for the patients with sexual pain).* *(2 marks)*

Status of improvements / Interventions	Improved	Not improved	Total
CBT	**8**	**2**	**10**
Self-reading	**2**	**6**	**8**
Total	**10**	**8**	18

(b) Calculate the absolute benefit increase of CBT intervention over self-reading. Show your calculation.
Absolute benefit increase (ABI) is a difference between the experimental event rate (EER) and control event rate (CER).

Improvement rate for CBT group, EER = 8/10 = 0.8
Improvement rate for self-reading, CER = 2/8 = 0.25
ABI = EER – CER = 0.8 – 0.25 = 0.55.

(3 marks)

(c) How many patients do you need to attend CBT sessions in preventing one patient from having subsequent sexual pain disorder? Show your calculation.

Numbers of patients that needed to attend CBT in preventing one patient from having subsequent sexual pain is based on the concept of numbers needed to treat, NNT; and NNT is a reciprocal of ABI.
NNT = 1/ABI = 1/0.55 = 1.8. It going to be rounded as 2.0.

Two patients are needed to attend CBT to prevent one patients from having subsequent sexual pain.

(2 marks)

(d) Comment on the significance of the above result?
This result, NNT = 2 is significant, because it is ≤ 10. The CBT was effective.

(2 marks)

(e) Your junior colleague asked you to explain this statement:

"NNT=2 for patients needed to attend CBT for sexual pain, with 95% CI[&]: 1.2 – 4.9."
[confidence interval[&]]

"Two patients are needed to participate in the CBT session in preventing one patient from having subsequent sexual pain, and I if I'm going to repeat this study 100 times, I'm 95 times confidence that the value of the NNT (ie. 2 patients) would ranged from 1.2 to 4.9, and the findings are statistically significant."

(3 marks)

(Total 50 marks)