
Comparative survey on retention of clinical pharmacology knowledge among students who have completed the second year at a medical college of Central Nepal

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Abstract: Objective: The present study was conducted to evaluate and compare the retention of clinical pharmacology knowledge among the students who had completed the Integrated Basic Medical Sciences program. Methods: This was a cross-sectional study carried out among the 2nd year exit students of National Medical College, Birgunj, Nepal during the month of September 2013. Students' responses were collected through a survey questionnaire prepared on the basis of renowned pharmacology text books including Katzung's Basic and Clinical Pharmacology, Bennett and Brown's Clinical Pharmacology, Goodman and Gilman's the Pharmacological Basis of Therapeutics and Rang and Dale's Pharmacology. The questionnaire was distributed among the participants and they were requested to tick the correct response independently. Data were entered in SPSS version 11.5 and evaluated for descriptive and inferential analyses using the Chi square test and Paired samples t test. Results: About 58% of the students were males and more than 66% of the total students were from different parts of India. The mean scores \pm standard deviations from the syllabus of first and second years were 9.08 ± 3.34 and 11.67 ± 3.54 respectively; and the scores were positively and significantly correlated ($r=0.542$, $p<0.001$). The difference in means of scores was 2.59 (95% CI: 2.02 to 3.15). Conclusions: The retention of clinical pharmacology knowledge is significantly lower from the first year syllabus than that from the second year which clearly indicates a decline in clinical pharmacology knowledge with passage of time.

Keywords: Clinical Pharmacology, Knowledge, Medical, Retention, Students

1. Introduction

Clinical pharmacology is a distinct specialty in an undergraduate medical (MBBS) curriculum. It is vital for a good clinician to have an up to date knowledge and skills of clinical pharmacology for safe and effective use of medicines [1].

Due to vast and complex syllabus, knowledge retention is a long-standing problem among medical students. Furthermore, retention of knowledge tends to degenerate with the passage of time and the fundamental basic medical science knowledge declines during the clinical years of medical education [2,3]. The decrease in basic medical science knowledge may be due to the reason that clinical textbooks do not provide detailed insight of basic medical sciences, nor are these required for passing clinical

examinations [4]. After one year of the gap, only about 2/3rd to 3/4th of knowledge will be retained even that will further decline below 50 percent in the next year [5]. However, the pattern of decline in knowledge varies with subjects, quality of initial learning and ongoing reinforcement [6,7].

As clinical pharmacology has a direct and substantial impact on clinical practices, it should not only be confined to premedical courses, but rather needs to be extended to clinical science course of the MBBS program [8,9]. However, this concept is lacking in developing country like Nepal.

Teaching-learning is a two way process requiring active participation of both the parties involved. Conventional lecture based teaching (i.e. one way method) has not been found to be much effective. Therefore, several modern novel

strategies, such as problem based learning (PBL), small group learning, puzzle based learning, team based learning (TBL) and peer assisted learning (PAL), have been introduced to overcome the learning difficulties in medical education and to improve a long-term retention of knowledge [10,11,12,13,14,15].

PBL is the most widely adopted teaching-learning method in medical education and is more effective towards improving and retaining knowledge for longer time, however, PBL requires well trained faculty [13,16]. Similarly, PAL is a recently introduced highly effective method of learning among students through their active involvement in teaching their fellow or junior students under the assistance of teachers and clinicians [17]. Not only the teaching methodology, but also several other factors such as, vast syllabus, irregular study habits, lack of seriousness in study, language barriers and communication skills, previous educational background and family problem affect students' performance [16,18,19].

This study was conducted to evaluate and compare the retention of pharmacological knowledge from 1st year and 2nd year MBBS courses among the students leaving two years of Integrated Basic Medical Sciences (IBMS) program, i.e. entering clinical phase of medical study.

2. Materials and Methods

2.1. Study Design and Sample

This was a cross-sectional prospective study conducted among 2nd year (11th batch) exit students of National Medical College (NMC), Birgunj, Nepal in September 2013. NMC is a well-established and large private medical institution located in Birgunj, a major city of Central Terai (plain), Nepal.

NMC was established in 2001 and is affiliated with Tribhuvan University (TU), Nepal. Currently NMC is running undergraduate (MBBS), postgraduate (MD, MS) in different medical subjects, certificate nursing, B Sc nursing and master of nursing (MN) courses. The college has a 1050-bedded teaching hospital which provides medical services for hundreds of people every day.

The target was to enroll all of the 150 students; however some students were either absent or unwilling to participate in the study at the time of survey. Therefore, 135 students participated in the study. The study was reviewed and approved by Institutional Review Committee (IRC) of National Medical College, Birgunj, Nepal.

2.2. Instruments and Instrumentation

Pharmacology text books such as Katzung's Basic and Clinical Pharmacology (11th edition), Bennett and Brown's Clinical Pharmacology (9th edition), Goodman and Gilman's The Pharmacological Basis of Therapeutics (10th edition) and Rang and Dale's Pharmacology (7th edition) were used as the

sources of information to prepare a set of questionnaire. The prototype or the most commonly used drugs from each of the pharmacology topics covering the entire syllabus were the prime criteria for selection of the questions to formulate the questionnaire. The questionnaire contained three sections: Section A (Demographic variables), Section B (25 MCQs from first year) and Section C (25 MCQs from second year) Pharmacology syllabi of MBBS program of Tribhuvan University (TU), Nepal. The questionnaire was then evaluated by five faculties including HOD of the Department of Pharmacology, National Medical College. Necessary amendments were made according to the comments or suggestions of the evaluators and a final set of questionnaire was prepared. Written informed consents were obtained from all the participants before the survey. The questionnaire was distributed among the participants and they were requested to tick the correct response independently.

2.3. Data Analyses

Data were entered in Statistical Package for Social Sciences (SPSS) version 11.5 for Chicago Inc. and considered for descriptive and inferential analyses. Associations were tested using the Chi square test. Paired samples t-test was used to see whether the students retain better pharmacological knowledge from first year or second year MBBS curriculum. A priori *p* value of 0.05 was used throughout the analyses and the results were considered statistically significant at *p*<0.05.

3. Results

About 58% of the students were males. Median age of the students was 21 years with inter quartile range of 20-22. Nearly 2/3rd of the total students were from different parts of India and the remaining 1/3rd were from various regions of Nepal. The combined scores obtained by the students were significantly associated with their gender, age, parents' occupation and origin (Table 1).

The mean scores \pm standard deviations obtained by the students from the syllabus of 1st year and 2nd year were 9.08 \pm 3.34 and 11.67 \pm 3.54 respectively. Furthermore, the scores obtained from the syllabus of 1st year and 2nd year MBBS pharmacology were found positively and significantly correlated ($r=0.542$, $p<0.001$). From 1st year syllabus, about 84% of the students secured up to 12 scores and only 16% obtained greater than 12 scores out of 25 scores. Similarly, about 56% of the students secured up to 12 scores and 44% obtained more than 12 scores out of 25 scores from 2nd year syllabus. Difference in means of scores from 1st and 2nd years was 2.59 (95% CI: 2.02 to 3.15) which was statistically significant at $p<0.001$.

Table 2 depicts that statistically significant relationship of gender and students' origin were observed only with the score obtained from the syllabus of 1st year.

Table 1. Demographic characteristics and their association with total score obtained (from 1st and 2nd year MBBS curriculum) (n=135).

Variables		Number (%)	Median score (IQR)	P value
Gender	Male	78 (57.8)	21 (16-26)	0.018
	Female	57 (42.2)	20 (15-26)	
Marital status	Single	131(97)	20 (16-26)	0.714
	Married	04 (03)	25 (19-27)	
Age (yrs)	19-20	52 (38.5)	22 (16-26)	0.030
	21-22	69 (51.1)	21 (16-27)	
	23-24	14 (10.4)	16 (14-23)	
Parent's occupation	Government service	42 (31.1)	20 (15-26)	<0.001
	Farming	22 (16.3)	20 (18-25)	
	Business	34 (25.2)	22 (15-26)	
	Doctor	16 (11.9)	21 (17-27)	
	Teaching	12 (8.9)	21 (15-26)	
	Miscellaneous	09 (6.7)	16 (13-19)	
Residence	Central region of Nepal	30 (22.2)	23 (16-28)	0.001
	Eastern region of Nepal	10 (7.4)	23 (19-26)	
	Western region of Nepal	04 (03)	22 (15-27)	
	Far-western region of Nepal	01 (0.7)	26 (26-26)	
	UP, Bihar & Jharkhand of India	55 (40.7)	20 (16-26)	
	Jammu &Kashmir, West Bengal, Gujarat and Orissa of India	35 (25.9)	20 914-24)	

Chi-square test (two tailed) was used to see the association

Table 2. Scores obtained from 1st and 2nd years MBBS curriculum and their relationships with gender and origin of students.

Syllabus	Variables	Score (Mean ± SD)	95% Confidence Interval		P value
			Lower limit	Upper limit	
1 st year	Male	9.31±2.995	8.63	9.98	0.042
	Female	8.77±3.766	7.77	9.77	
2 nd year	Male	11.60±3.690	10.77	12.43	0.525
	Female	11.75±3.366	10.86	12.65	
1 st year	Nepalese students	9.67±2.895	8.77	10.56	0.033
	Indian students	8.79±3.482	8.06	9.52	
2 nd year	Nepalese students	12.53±3.539	11.47	13.60	0.380
	Indian students	11.23±3.487	10.50	11.96	

Chi-square test (two tailed) was used to see the association

4. Discussion

In an effort to elucidate how the retention of pharmacology knowledge varies and correlates with the passage of time, we conducted a cross-sectional study among 135 medical students leaving two years of Integrated Basic Medical Sciences (IBMS) program.

Gender wise comparison reveals that about 58% of the students were males. The finding of the study conducted by Banerjee et al also supports this [9]. The preference of males for medical education may be due to gender discrimination from the parents [20]. The students studying MBBS in National Medical College, Birgunj were from Nepal and India and about 2/3rd of them were Indians. The enticing factor for enrolling more foreign students mainly Indians is more monetary gain and also they easily get admitted as compared to their Nepalese counterparts [21]. Analyzing the occupational background of students' parents illustrates a mixed category, however, a larger fraction (56%) of the parents were involved in government service and business.

There was significantly lower retention of pharmacological

knowledge from the 1st year compared with the 2nd year curriculum. Out of 25 scores from each year's curriculum, only 16% and 44% of the students obtained above 12 (~ 50% or higher) scores from the syllabus of 1st year and 2nd year respectively. The maximum time gaps in the pharmacology content studied by the students during 1st year and 2nd year MBBS curriculum were two years and one year respectively. Thus, the decline in knowledge was more from 1st year syllabus as compared to that of 2nd year [5]. If practice is not done, there is initially slight loss of knowledge for 1.5 to 2 years, but thereafter knowledge loss accelerates negatively [22].

In medical practice, an upgraded knowledge of integrated basic medical sciences subjects plays a vital role to prepare a competent clinician of modern era [23]. Thus, it would be worthwhile to integrate basic medical sciences and clinical medical sciences [24].

The scores obtained by the students were associated with their gender and origin. A study conducted by Malau-Aduli et al in Australia also suggests the correlation of pharmacology knowledge with students' origin [25]. International students had significantly lower scores than their domestic

counterparts. This is due to language barriers and communication skills, lack of seriousness in study, irregular study habit, previous education background, vast syllabus and their failure to adapt to the foreign environment [16,18].

5. Conclusions

The study findings conclude that the retention of pharmacology knowledge is significantly lower in the 1st year syllabus than in the 2nd year. This clearly indicates decline in pharmacology knowledge with time. As clinical pharmacology has direct impact on rational drug therapy, so it would be sensible to include clinical pharmacology in clinical years of medical education. Doing so will substantially contribute towards optimization of drug therapy.

Additionally, the study also highlight that knowledge decline is more among Indian students than among their Nepalese counterparts. Thus, foreign students need more educational counseling and interventions.

As this study was conducted only among 2nd year exit medical students of a medical college of Nepal, the study suggests a multi-centric study including students from clinical years of medical education.

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