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# Analysis of Pharmacology undergraduate BDS question papers: Comparative study of content areas.

Pharmacology

**KEYWORDS:** Pharmacology, Theory papers, Content validity, Assessment.

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## ABSTRACT

Broad knowledge of Pharmacology is essential for a practicing dentist to prescribe medications, avoid drug interactions and recognize and treat adverse reactions. Assessment has a direct impact on students' learning and hence, assessment method and its content should be rightly chosen. This study analyzed the BDS undergraduate Pharmacology university question papers to find weightage given to various content areas and also to find the correlation between weightage and time given to the respective content areas in the form of lectures. The results were compared between old syllabus (OS) and new syllabus (NS) BDS question papers and also with MBBS question papers. Maximum weightage was given to General Pharmacology in the OS and Chemotherapy in the NS BDS papers. Correlation of weightage and lecture time of NS BDS papers was much better than the OS papers. There was an improvement in the paper setting pattern of BDS question papers over the years.

**Introduction**

Broad knowledge of Pharmacology enables a practicing dentist to prescribe drugs and recognize and treat the associated adverse effects of the drugs, including certain medical emergencies encountered during the course of treatment. BDS students, being future dentists, should learn Pharmacology thoroughly at their undergraduate level.

As assessment, an important component of educational system, has direct impact on learning, the choice of method of assessment should be proper. 'Written examination' is an important assessment tool which mainly aims at assessing the component of 'knowledge'.[1] When a large number of students have to be assessed, it being easy and cost effective, is a preferred option.[1] It is known that students learn for the sake of examinations and so rely on questions which were asked in the papers of previous examinations[2], hence the content areas addressed in these examinations should be well planned. In this study we made an attempt to analyse the content validity in the question papers of university examinations, in Pharmacology, for BDS course and also compared these findings with the MBBS course.

**Aims**

1) To find the weightage given to various content areas in the Pharmacology theory examinations for BDS students.

2) To compare the weightage of content areas of old syllabus theory papers with the new syllabus theory papers and also to compare these with MBBS papers.

3) To observe correlation between the weightage given to content areas and the time allotted to them in the form of lectures and compare the old and the new BDS and MBBS syllabi for the same.

**Methodology**

This was a retrospective, observational study conducted after due permission from the institutional ethics committee. Undergraduate BDS Pharmacology theory question papers of Goa university examinations from the years 1991 to 2016 were analysed. These papers were divided into: old syllabus question papers (OS-QP), from the years 1991 to 2009, and the new syllabus question papers (NS-QP), from the years 2010 to 2016. There were a total of 38 OS-QP and 14 NS-QP.

Each paper was analysed for the weightage given to each content area and its subtopics. Time allotted to these content areas in the form of lectures was also noted and correlated with the weigtage. Observations of the OS-QP and the NS-QP were then compared.

These observations were also compared with the MBBS Pharmacology university question papers from the years 2000 to 2016. Students had to answer two papers of 44 marks each, which included 2 optional short notes of 2 marks each. Thus the total marks of both papers were 88, including optional marks. A total of 34 papers were included in the study as we analysed paper 1 and 2 of an examination as one paper.

Descriptive statistics was used. Quantitative variables were compared using correlation. Data was compiled in MS excel. Statistical analysis was done using SPSS version 17.0.

**Results**

52 BDS question papers were analysed, of which 14 were NS-QP and 38 were OS-QP. Each NS-QP was of 80 marks with two optional short notes of two marks each. Marks in the OS-QP varied from 60 to 70 because optional questions differed in some papers. Totally there were 12 content areas in both syllabi but some sub-topics were added in the new syllabus, as depicted in table 1.

**Table 1:** Content areas and their subtopics in the new and the old syllabi of BDS.

| | Topics | Old syllabus | Sub-topics added in new syllabus |
|---|---|---|---|
| 1 | General Pharmacology | General Pharmacology<br>Dental Pharmacology | – |
| 2 | Autonomic Nervous System (ANS) | ANS<br>Skeletal muscle relaxants | – |
| 3 | Autacoids | Histamine<br>Rennin–angiotensin system | Prostaglandins<br>Serotonin |
| 4 | Cardio Vascular System (CVS) | Antianginals<br>Antihypertensives<br>CHF<br>Shock | – |

| | | | |
|---|---|---|---|
| 5 | Blood | Anticoaglants<br>Antithrombotics<br>Fibrinolytics<br>Hemostatics<br>Hematinics | Hypolipidaemics |
| 6 | Central Nervous System(CNS) | General anaesthetics<br>Sedatives/hypnotics<br>Pre-anaesthetic medications<br>Opioids<br>Local anaesthetics<br>Phenytoin | Antiepileptics<br>Psychotropics |
| 7 | Chemotherapy | General<br>Beta lactams<br>Fluoroquinolones<br>Aminoglycosides<br>Tetracyclines<br>Macrolides<br>Sulphonamides<br>Antifungals<br>Metronidazole | Broadspectrum antibiotics<br>Antivirals<br>Tuberculosis<br>Leprosy<br>Malaria<br>Cancer |
| 8 | Hormones | Thyroid<br>Diabetes<br>Corticosteroids<br>Calcium metabolism<br>Oral contraceptives | Sex hormones & anabolic steroids |
| 9 | Gastro Intestinal System (GIT) | Diarrhea<br>Constipation<br>Peptic ulcer<br>Antiemetics | – |
| 10 | Kidney | Diuretics | – |
| 11 | Respiratory System (RS) | Cough<br>Bronchial asthma | – |
| 12 | Non Steroidal Anti Inflammatory Drugs (NSAIDS) | NSAIDs | – |

General Pharmacology, CNS, Chemotherapy and Hormones were the major content areas noted in both the BDS syllabi. The weightage to content areas, in the form of marks allocated to various topics, in both the syllabi question papers were similar except for some topics, as shown in table 2. General Pharmacology was given more weightage in the OS-QP whereas in the NS-QP Chemotherapy and CVS were given more weightage.

Overall distribution of marks in the BDS papers was observed to be in proportion to the time allotted to various topics in the form of lectures. There was a positive correlation between the percentage time and the percentage marks given to various topics as depicted in table 2 and figure 1 & 2. However the correlation was stronger in NS-QP (r= 0.91) as compared to the OS-QP (r=0.68), suggesting an improvement in the assessment pattern in the recent years.

**Table 2:** Percentage marks and time to various topics in the old and new BDS syllabi.

| TOPIC | Old BDS Syllabus | New BDS Syllabus | | |
|---|---|---|---|---|
| | % Marks | % Time | % Marks | % Time |
| General Pharmacology | 24.30 | 10.87 | 17.98 | 12.70 |
| Chemotherapy | 16.32 | 21.74 | 19.42 | 22.22 |
| CNS | 10.74 | 13.04 | 11.83 | 12.70 |
| Hormones | 10.64 | 8.70 | 10.19 | 12.70 |
| ANS | 9.10 | 10.87 | 7.79 | 9.52 |
| CVS | 5.88 | 10.87 | 8.85 | 9.52 |
| NSAIDS | 5.73 | 4.35 | 5.00 | 3.17 |
| Blood | 5.52 | 8.70 | 6. 54 | 6.35 |
| GIT | 5.42 | 4.35 | 3.17 | 3.17 |
| Autacoids | 4.65 | 2.17 | 3.75 | 3.17 |
| RS | 1.48 | 2.17 | 3.37 | 3.17 |
| Kidney | 0.20 | 2.17 | 2.12 | 1.59 |

**Figure 1:** Percentage marks and percentage time in the old BDS papers.

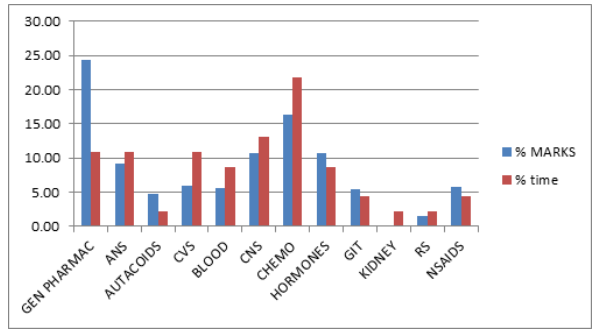
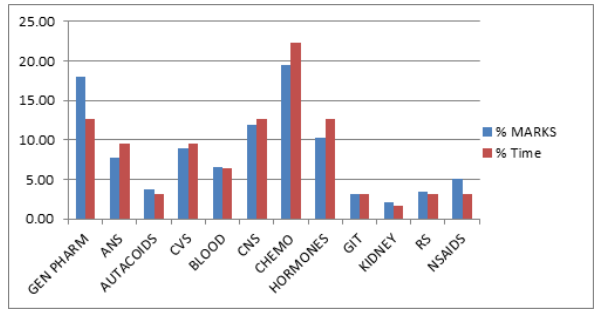



**Figure 2:** Percentage marks and percentage time in the new BDS papers.




In the MBBS question papers, the overall weightage of the topics was as follows: Chemotherapy (16.74%), ANS (12.65%), CNS & LA (11.87%), Hormones (11.19%), CVS (11.16%), General Pharmacology (7.60%), Blood (6.40%), RS (4.76 %), Autacoids (4.55%), GIT (3.91%), NSAIDs-Gout-RA (3.38%), Kidney (2.91%) and Miscellaneous (2.88%). Weightage given to various topics in the MBBS and BDS courses of the old (years 2000 to 2009) and the new (years 2010 to 2016) syllabi were compared as shown in table 3.

**Table 3:** Comparison of weightage to topics in the old and the new syllabi of MBBS and BDS question papers.

| TOPIC | % MARKS | | | |
|---|---|---|---|---|
| | MBBS (old) | BDS (old) | MBBS (new) | BDS (new) |
| General Pharmacology | 7.66 | 24.30 | 7.63 | 17.98 |
| Chemotherapy | 17.25 | 16.32 | 16.15 | 19.42 |
| CNS | 11.80 | 10.74 | 12.42 | 11.83 |
| Hormones | 11.62 | 10.64 | 10.47 | 10.19 |
| ANS | 12.34 | 9.10 | 13.23 | 7.79 |
| CVS | 10.96 | 5.88 | 11.28 | 8.85 |
| NSAIDS | 2.81 | 5.73 | 4.06 | 5.00 |
| Blood | 6.23 | 5.52 | 6.49 | 6. 54 |

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| | | | | |
|---|---|---|---|---|
| GIT | 3.65 | 5.42 | 3.98 | 3.17 |
| Autacoids | 4.97 | 4.65 | 3.81 | 3.75 |
| RS | 4.91 | 1.48 | 4.63 | 3.37 |
| Kidney | 2.99 | 0.20 | 2.92 | 2.12 |
| Miscellaneous | 2.81 | 0.00 | 2.92 | 0.00 |

In the MBBS question papers, correlation between weightage to content areas and lecture time was observed to be 0.92 in the OS-QP and 0.93 in the NS-QP which were similar to the BDS NS-QP.

In the BDS NS-QP, questions about Parkinsonism and Vancomycin were asked which were not included in the dental curriculum. Some important changes observed in NS-QP were inclusion multiple choice questions (MCQs) or completion type of short answer questions (SAQs) ( fill in the blanks) of 10 marks. There was also consistent pattern of setting paper in the form of 2 structured essay questions (10 marks each), 2 short notes (5 marks each and an option) and 5 MCQs or SAQs in each of the two sections (1 mark each). OS-QP had two sections of 30 marks each but the pattern of setting paper in the form of structured essay questions and short notes varied in every paper.

**Discussion**

Assessment can be formative or summative.[3] In the university examinations, essentially a type of summative assessment, the questions asked serve as a template for the students of subsequent batches to direct their learning processes and hence the content areas addressed in these examinations are of utmost importance. Weightage given to various content areas should also be based on the commonly encountered health problems and those of national importance.[4]

This study aimed at finding out the content areas in Pharmacology university examinations of the BDS students and also comparing them with the MBBS examinations. General Pharmacology, including dental Pharmacology, was rightly found to be a content area with major weightage. Other topics which were given more weightage were Chemotherapy, CNS and Hormones. Weightage of Chemotherapy and CVS was observed to be higher in the NS-QP. This appears to be appropriate as in recent times there is increase in cardiovascular mordities[5, 6] and emergence of antibiotic resistance[7, 8] too. It was also observed that in NS-QP, correlation between weightage to topics and lecture time was much better than the OS-QP. The NS-QP were restyled to accommodate SAQs and objective type of questions. SAQs when constructed well, allow a more objective assessment [9] and also help to assess specific content areas.[1] The objective type questions are more reliable because of pre-determined correct answers and more content can be tested.

The major difference between MBBS and BDS question papers, in new as well as old syllabi, was the weightage given to General Pharmacology. This was due to inclusion of dental Pharmacology, which is not a part of MBBS curriculum. Weightage given to ANS, CVS and RS was less in BDS compared to MBBS papers, however, in BDS NS-QP, weightage for CVS increased. Miscellaneous topics which included Poisonings, Vitamins and sera, Immunosuppressants etc. were not a part of BDS curriculum. Correlation between weightage to content areas and lecture time was much better in MBBS papers than BDS OS-QP, but was similar to the BDS NS-QP.

The observations in this study suggest an improvement in BDS paper setting patterns over the period of time; however, as there were no set guidelines laid for distribution of marks or pattern of framing questions, the examiners used their judgement for setting the papers. This may sometimes lead to inconsistencies in the question paper frame work. For quality learning it is essential to have alignment of curricular objectives, teaching-learning activities and assessment tasks. One of the ways to achieve this is 'test blueprinting' which specifies the content areas topics, the domains of learning and the appropriate methods or tools of assessment and therefore serves as a reference framework for the question paper setter to prepare questions according to the accepted norms and guidelines. This can reduce occurrence of two major threats to validity: construct under-representation which means less weightage to an important content area, and construct irrelevance variance which means inclusion of flawed item format, too easy or too difficult questions or examiner bias.[10] However, finally it is the faculty who should prepare a good quality assessment using all possible techniques or methodologies available.

**Conclusion**

It was noted that there was an improvement in the paper setting pattern of BDS university Pharmacology theory examinations. However, as students can easily access host of current information via recent technologies, the teachers should also intelligently make use of such technologies for learning and developing assessment tools. Test blueprinting, table of specifications, question banking, discussion with subject experts together with integrated problem based and community oriented teaching can bring about consistency and improvement in paper setting.

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