Original Article

A causal relationship between knowledge of Sanskrit language and results of Bachelor of Ayurvedic Medicine and Surgery examination: An analytical study

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Abstract

Introduction: Education in the field of Ayurveda is regulated by the Central Council of Indian Medicine (CCIM). The weightage of Sanskrit subject in first Bachelor of Ayurvedic Medicine and surgery (BAMS) course has been decreased from 250 marks to 100 marks by CCIM notification in 2012. Decrease in weightage of marks of Sanskrit subject from 250 marks to 100 marks may affect the knowledge of Sanskrit subject. **Aims:** To established a causal relationship between knowledge of Sanskrit language and results of Bachelor of Ayurvedic Medicine and Surgery examination. **Material and Methods:** Comparisons of knowledge, attitude and practice (KAP) scores and average marks in BAMS examination of two groups of students of 2nd and 3rd year BAMS and who have passed 1st year BAMS professional examination with Sanskrit subject of either 250 marks or 100 marks regarding were done. The relationship between prior exposure to Sanskrit at school level and average marks in BAMS examinations was also assessed through this study. It was a cross-sectional KAP questionnaire study. KAP questionnaire to assess KAP toward Sanskrit subject was developed and was reviewed by expert faculties. A total of 200 students of various Ayurvedic colleges from Mumbai and Navi Mumbai were enrolled in the study. The data was analyzed by appropriate statistical tests. **Results and Observation:** It was observed that in spite of decrease in weightage of marks of Sanskrit subject, there was no significant difference in KAP score as well as average marks in BAMS examination in both the groups. There was significant difference in number of students who had studied Sanskrit subject and who had not studied it at school level. There were significant differences in KAP score and average marks in BAMS examination in those two groups. **Conclusion:** Students who have studied Sanskrit at school level find it easier to get good marks in BAMS examination, and particularly Sanskrit subject. Due to less weightage of Sanskrit subject, although syllabus is not decreased to that extent; there is very limited scope to ask various questions to judge the understanding level of students. Existing or previous syllabus of Sanskrit do not make any difference in understanding of subject and also in marks in University examination.

Keywords: Ayurveda education, Knowledge, Attitude, and Practice study, Sanskrit

Introduction

"Ayurveda" is one of the oldest documented systems of health care which deals elaborately with measures for healthy living. Education in the field of Ayurveda is regulated by the Central Council of Indian medicine (CCIM), which came into existence by the act of Parliament.[1] Since 1971, after formation of CCIM, Ayurvedic syllabus was being taught in local languages. The admission criteria for Bachelor of Ayurvedic Medicine and Surgery (BAMS) course is higher secondary certificate (HSC) examination and common entrance test with physics, chemistry and biology subjects. Prior knowledge of Sanskrit is not required in few states of India.

Access this article online

Quick Response Code:

Website: www.ayujournal.org

DOI: 10.4103/ayu.AYU_53_16

The basic literature of Ayurveda, that is, *Samhita* are written in Sanskrit language, the language of ancient India. These *Samhita* are integral part of the Ayurveda education. Therefore, knowledge of Sanskrit language becomes necessary to learn Ayurveda. Previously, Sanskrit was one of the major subjects in 1st year of BAMS for 250 marks, that is, theory for 200 marks (2 theory papers of 100 marks each) and viva-voce for 50 marks.[2] The teaching of Sanskrit is aimed to make a student capable of reading and understanding ancient

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How to cite this article: Pawar VA. A causal relationship between knowledge of Sanskrit language and results of Bachelor of Ayurvedic Medicine and Surgery examination: An analytical study. Ayu 2017;38:57-61.

Ayurvedic texts written in Sanskrit language. From March 2012 (CCIM Notification), there is only paper of Sanskrit of 100 marks (1 theory paper) in 1st year BAMS.[3] There is no viva-voce for this subject at present.

According to many Ayurvedic physicians, well versed knowledge and proper understanding of Sanskrit is essential for Ayurveda. The teaching of Sanskrit should be such that a student must become capable of reading original texts.[4] For qualitative improvement in learning process of Ayurveda, Sanskrit as a subject is considered necessary by many renowned Ayurvedic physicians. This has become need of an hour to see whether the knowledge of Sanskrit language is essential to succeed in BAMS examination. It is also required to see whether students who learn Sanskrit at school level find it easier to succeed in BAMS examination due to prior exposure to Sanskrit language.

Many students who take admission to BAMS course are not exposed to Sanskrit. It is also necessary to see the adequacy of current syllabus of Sanskrit subject in 1st year BAMS to make students capable of reading original Ayurvedic texts with proper understanding. Decrease in weightage of marks of Sanskrit subject from 250 marks to 100 marks may affect the knowledge of Sanskrit subject.

Keeping above facts in mind, the observational study in the form of Knowledge, Attitude, and Practice (KAP) survey was planned with enrolment of students from various Ayurvedic colleges in Mumbai and the vicinity of Mumbai. This study was carried out to assess the knowledge of Sanskrit subject, the attitude and practice of students regarding Sanskrit subject and to show a causal relationship between knowledge of Sanskrit language and results of BAMS examination.

Materials and Methods

This study was a cross-sectional pilot study. A KAP survey method was adopted, in which data were collected by KAP questionnaire. A questionnaire (for attitude and practice) along with a question paper as a general aptitude test (knowledge) for Sanskrit which assesses the basic knowledge of Sanskrit was used to carry out the present study.

Total 200 study participants were enrolled from four Ayurvedic college of Mumbai and Navi Mumbai, Maharashtra. Students of 2nd year and 3rd year professional BAMS who have passed 1st year BAMS professional examination with Sanskrit subject of either 250 marks or 100 marks successfully, irrespective of their age, sex, and nationality were included in the study. Students who are registered under BAMS course but who have not passed the 1st year BAMS professional examination with Sanskrit subject were excluded to avoid immature perception. The students who have completed BAMS course were also excluded.

Total numbers of study participants included in this study were 200 which were divided into randomly equal two groups with 100 students in each group as students who have passed Sanskrit subject of 250 marks in 1st year BAMS course and students who have passed Sanskrit subject of 100 marks in 1st year BAMS course. Stratified sampling method was used for the selection of students to have equal representation of all colleges.

Preparation of the knowledge, attitude, and practice questionnaire

A list of items was prepared on the basis of interactions with teachers and research scientists of various educational institutions. Various sources of literature such as journals, news reports, and other articles were also reviewed for framing appropriate questions. The questionnaire contained open-ended questions (to assess the knowledge) and closed-ended questions (to assess the attitude and practice) in simple English language. While framing the questions, special attention was given to avoid biases or leading questions to derive favorable replies from respondents.

1. General aptitude test (for assessment of knowledge): Maximum 50 points
2. Questionnaire for assessment of attitude: Maximum 42 points
3. Questionnaire for assessment of practice: Maximum 30 points.

The respondents were given the ample space to write answers to open-ended questions. They were given options for recording their responses for closed-ended questions in the form of "yes," "no" and "do not know" by recording a check-mark in the respective boxes provided next to each question. For attitude and practice questions, positive or negative responses which were in favor of Sanskrit subject were assigned 3 points while those against Sanskrit subject in 1st year BAMS course were assigned 1 point. "Do not know" response was assigned 2 points.

The respondents were also requested to record some basic data related to them such as name, age, sex, class, and aggregate marks in secondary school certificate and HSC, have they studied Sanskrit at school/college level. The external validity of questionnaire for its content was done by review from research scientists in the field of Ayurveda and Sanskrit both.

Initially, preliminary questionnaire was distributed to 10 respondents, that is, students of an Ayurvedic college of India. After obtaining the questionnaire back from the respondents, the respondents were asked whether they faced any difficulty in answering the items. Depending on the feedback from respondents, minor changes in structure and language of questions were done.

The final questionnaire contained – general aptitude test (to assess knowledge) with open-ended questions for 50 marks, 13 closed-ended questions for the assessment of attitude, and 10 closed-ended questions for the assessment of practice of Sanskrit language. This final tested questionnaire was printed on A4 size paper and was distributed to about 200 students from various Ayurvedic educational institutions.

Ethical clearance was taken from the Institutional Ethics Committee. All study participants were contacted directly in their respective colleges. The respondents were given proper information regarding the purpose of the study and assuring the strict confidentiality related to respondents. The respondents were also asked to sign another declaration stating that their participation in the study was purely voluntary. Then, the questionnaires were distributed, given 60 min to fill them and hand it back. The questionnaires thus filled were collected. The collected data were entered into Microsoft Excel Spreadsheet in MS Office 2007. The data were analyzed in an unbiased manner to draw valid conclusions.

Statistical analysis

Appropriate statistical tests were applied to the collected data.[5]

For quantitative data – parametric tests were applied:

1. Correlation: To establish correlation between the KAP score and Average Percentage in BAMS exams obtained by students
2. Unpaired *Z* - test: To compare the KAP score and average marks in BAMS examination between the two groups

For categorical data – nonparametric test was applied:

3. Chi-square test – test of goodness of fit.

The obtained data were analyzed statistically using GraphPad InStat 3 version. GraphPad Software, Inc., 7825 Fay Avenue, Suite 230, La Jolla, CA 92037 USA.

A level of $P < 0.05$ was considered as statistically significant, $P < 0.01$ or $P < 0.001$ was considered as highly significant.

Results

A total of 200 students were enrolled from various Ayurvedic colleges of Mumbai and Navi Mumbai who have passed Sanskrit subject of 250 marks or 100 marks in 1st year BAMS course.

Group I comprised of 100 students who passed in professional 1st year BAMS university examination with Sanskrit subject of 250 marks. Out of 100 students, 57 students were studying in 3rd year BAMS course and 43 in 2nd year BAMS course. Group 2nd year included 100 students who passed in professional 1st year BAMS university examination with Sanskrit subject of 100 marks. Out of 100 students, 48 students were studying in 3rd year BAMS course and 52 in 2nd year BAMS course [Table 1].

There was moderately positive correlation between KAP score and average marks in BAMS examination in both the groups [Table 2].

There was no statistically significant difference between KAP scores of two groups (students who have passed Sanskrit subject of 250 marks in 1st year BAMS course and students who have passed Sanskrit subject of 100 marks in 1st year BAMS course).

There was no statistically significant difference between the average marks in BAMS examination of two groups (students who have passed Sanskrit subject of 250 marks in 1st year BAMS course and students who have passed Sanskrit subject of 100 marks in 1st year BAMS course) [Table 3].

There was statistically significant difference between the number of students taking admission to BAMS course, who have studied and who have not studied Sanskrit at school level.

Table 1: Correlation between knowledge, attitude, and practice score and average marks in BAMS examination (students who have passed Sanskrit subject of 250 marks in 1st year BAMS course and students who have passed Sanskrit subject of 100 marks in 1st year BAMS course)

Group	Correlation coefficient (*r*)	Type of correlation	*t*	Significance
Group I (*n*=100)	0.19	Moderately positive	1.92	Insignificant at 5% level of significance
Group II (*n*=100)	0.35	Moderately positive	3.70	Significant at 5% level of significance
Group I and Group II (*n*=200)	0.28	Moderately positive	4.10	Significant at 5% level of significance

Table 2: Comparison of the knowledge, attitude, and practice score of two groups (students who have passed Sanskrit subject of 250 marks in 1st year BAMS course and students who have passed Sanskrit subject of 100 marks in 1st year BAMS course)

Group	Mean±SD	SE of mean	*Z*
Group I (*n*=100)	86.24±9.65	1.39	0.187
Group II (*n*=100)	85.98±10.04		Insignificant at 5% level of significance

SD: Standard deviation, SE: Standard error

Table 3: Comparison of the average marks in BAMS examination of two groups (Students who have passed Sanskrit subject of 250 marks in 1st year BAMS course and Students who have passed Sanskrit subject of 100 marks in 1st year BAMS course)

Group	Mean±SD	SE of mean	*Z*
Group I (*n*=100)	61.32±4.40	0.73	0.30
Group II (*n*=100)	61.10±5.83		Insignificant at 5% level of significance

SD: Standard deviation, SE: Standard error

Table 4: Comparison between numbers of students who had Sanskrit subject at school level and who had no Sanskrit subject at school level

Total sample size	Students had Sanskrit subject at school level	Students had no Sanskrit subject at school level	χ^2
200	85	115	4.50 Significant at 5% level of significance

Group A: Students had Sanskrit subject at school level (*n*=85),
Group B: Students had no Sanskrit subject at school level (*n*=115)

Students who have not studied Sanskrit at school level are more in number. Prior knowledge of Sanskrit is not a criterion for admission to BAMS course in the state where the study was conducted [Table 4].

There was statistically significant difference in KAP score and average BAMS marks of the two groups, that is, who have studied and who have not studied Sanskrit at school level. KAP score and average BAMS marks found to be more in group of students who had studied Sanskrit subject at school level [Table 5].

Discussion

Ayurveda is essentially a science, which deals with the philosophy of life. Ayurvedic system of medicine indeed is the most ancient system of health care. The quality of Ayurveda education has been a matter of concern since long and has attracted criticisms of various kind. Through various studies in the field of Ayurvedic education, it has been stressed that significant reforms are necessary in current syllabus of Ayurveda.[6]

All original ancient Ayurvedic texts are written in Sanskrit language. Necessity of knowledge of Sanskrit in Ayurvedic studies has been assessed through the present study. The present study was an attempt to see the adequacy of current syllabus of Sanskrit to make the students proficient in reading and proper understanding of original Ayurvedic texts. Role of prior exposure of Sanskrit at school level was also assessed through this study.

This observational study was conducted through KAP survey which was tried for the Ayurvedic and Sanskrit studies. In a KAP survey, a certain level of populations' knowledge, attitudes, and practices related to a specific issue is assessed. KAP surveys can be implemented for various reasons. It can be useful as a diagnostic tool, as a development or as an evaluation tool.[7] The actual aim of conducting KAP study was to know the difficulties faced by the students in understanding the subjects mainly through attitude section of the questionnaire.

Table 5: Comparison between Groups A and B (students who had Sanskrit subject at school level and who had no Sanskrit subject at school level)

Comparison between	Group	Mean±SD	SEM	*Z*	Inference
KAP score	Group A	89.8±9.42	1.27	5.83	Significant at 5% level of significance
	Group B	82.4±8.27			
Knowledge score	Group A	33.6±5.64	0.82	5.61	Significant at 5% level of significance
	Group B	29.0±5.91			
Attitude score	Group A	34.2±3.32	0.47	1.7	Significant at 5% level of significance
	Group B	33.4±3.24			
Practice score	Group A	22.0±4.47	0.62	3.39	Significant at 5% level of significance
	Group B	19.9±4.16			
Average BAMS marks	Group A	62.1±5.27	0.75	2.8	Significant at 5% level of significance
	Group B	60.0±5.15			

BAMS: Bachelor of Ayurvedic Medicine and Surgery, SD: Standard deviation, SEM: Standard error of mean, KAP: Knowledge, attitude, and practice

Moderately positive correlation between KAP scores and average BAMS marks was found in both the groups. Knowledge of Sanskrit subjects facilitates students to succeed in BAMS university examinations.

There was no statistically significant difference between KAP scores of two groups. In spite of decrease in weightage of Sanskrit subject in 1st year BAMS, no difference (statistically significant) was found in both the groups regarding KAP score and marks in BAMS examination. It shows that Sanskrit which is taught at 1st year BAMS level makes no difference in knowledge of students. Prior exposure of students to Sanskrit subject at school level facilitates students to get good marks in BAMS examinations.

There was statistically significant difference between the number of students taking admission to BAMS course, who have studied and who have not studied Sanskrit at school level. Students who have not studied Sanskrit at school level are more in number. Prior knowledge of Sanskrit is not a criterion for admission to BAMS course. Statistically significant difference was found in KAP score and average BAMS marks in both these groups. Students who have not studied Sanskrit at school level generally find it difficult to succeed in BAMS examinations compared to students who were exposed to Sanskrit at school level.

The students who have studied Sanskrit at school level had basic knowledge of Sanskrit grammar such as *Sandhi*, *Karaka*/*Vibhakti*, *Samasa*, *Shabda Dhatu Rupavali*, *Pratyaya*, and *Upasarga*, but they were not exposed to *Panini Sootra* from which the rules of grammar were derived. These students were also exposed to Sanskrit vocabulary in the form of essays, short stories, poems, *Subhashita*, synonyms from *Amarakosha*. These students could correctly read, pronounce, and write the Sanskrit verses as well as could understand the verses to some extent (up to the 10th grade Sanskrit).

Their score at school level was not recorded, as it was beyond the scope of the present study. Prior exposure to Sanskrit, irrespective of their score at school level, was only considered. Basic knowledge of Sanskrit language irrespective of their score at school level (even they have just passed the examination) would be helpful to study the language to further level.

It shows that Sanskrit which is taught at school level facilitates students to read, understand, and recite the Ayurvedic texts. Furthermore, due to lack of previous exposure to Sanskrit, the language presents a barrier rather than an effective tool for many students to understand Ayurveda.[8]

For qualitative improvement in learning process of Ayurveda, Sanskrit as a subject is necessary. It would improve the general understanding (of Ayurveda) of students at UG and PG level and would ultimately lead to the establishment of Ayurveda as a sound, safe, and economic health-care system.

Conclusion

Students who have studied Sanskrit at school level find it easier to get good marks in BAMS examination and particularly Sanskrit subject. Due to prior exposure to Sanskrit language at school level, students have good knowledge of Sanskrit, have positive attitude toward it and also practice it. The students who had learned Sanskrit language before admitting to the BAMS course had basic knowledge of Sanskrit in terms of grammar and vocabulary.

In both the groups, the syllabus was somewhat similar. In earlier syllabus, there was text *Ayurvediya Hitopadesha*, which was replaced by *Sushruta Samhita Sharira Sthana*, chapter four. Distribution of mark for Sanskrit subject was dissimilar in both the formats.

Due to less marks allotted to Sanskrit subject, although syllabus is not decreased to that extent, there is very limited scope to ask various questions to judge the understanding level of students. As there is no viva-voce for Sanskrit subject, it makes difficult to assess students' reciting and understanding abilities of the subject. Sanskrit which is taught at 1st year of BAMS professional course level makes no difference in the knowledge of students. Existing or previous syllabus of Sanskrit subject do not make any difference in understanding of subject and also in average gained marks in University examination of all subjects. Hence, there is a need to introduce a short bridge course in Sanskrit for students who are not exposed to Sanskrit at school level and had taken admission to BAMS course.

The similar study may be carried out with large sample size, with long duration of study and wider geographical area, that is, with inclusion of students from various Ayurvedic colleges all over India to assess the long-term learning outcomes.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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