PSYCHOLOGY AND EDUCATION (2021) 57(9): 7625-7632
ISSN: 0033-3077

"ASSESSMENT OF LEARNING STYLES AND ITS ASSOCIATION WITH PAST ACADEMIC PERFORMANCE OF UNDERGRADUATE DENTAL STUDENTS OF HAZARIBAG CITY-A CROSS SECTIONAL SURVEY"

1.Dr Silpi Chatterjee (corresponding author)
Senior Lecturer Department of Public Health Dentistry Hazaribag college of dental sciences and hospital, Jharkhand
2. Dr Asim Mustafa Khan
College of Dentsitry Department of Biomedical Dental Science Imam Abdulrahman Bin Faisal University
3.Dr Jayesh
Senior Lecturer Department of Oral and Maxillofacial Surgery Hazaribag college of dental sciences and hospital, Jharkhand
4. Dr RishveePrateek
MDS, Department of Prosthodontics and Crown &Bridge Private Practitioner, Hazaribag, Jharkhand
5. Dr RohitAnand
Senior Lecturer Department of Prosthodontics and Crown &Bridge Hazaribag college of dental sciences and hospital, Jharkhand
6. Dr Manish Kumar
Post Graduate Student Department of Prosthodontics and Crown &Bridge Hazaribag college of dental sciences and hospital, Jharkhand

ABSTRACT

Aim: To assess the learning style preferences of undergraduate dental students in Hazaribag city and to investigate whether learning style preferences is associated with past academic performance. **Methodology:** A descriptive cross- sectional survey was conducted among the dental students in Hazaribag city. Learning style was assessed using a validated VARK questionnaire containing sixteen items with four answer selections corresponding to the four sensory modalities (Visual, Aural, Read/write , Kinaesthic) and past academic performance was collected from the respective college authorities. Descriptive statistics was applied and Chi-square test was used to assess the association between learning style preferences and past academic performance. **Results:** Majority of the dental students preferred bimodal style (35.5 %) followed by trimodal (20.4 %), quad modal (17.2 %) ,kinesthetic (13.3 %) , aural (7.7 %) , verbal (3.4 %) and read and write (2.4 %). There was no significant association between learning style preference and past academic performance of the students (p = 0.9). **Conclusion:** The results of this study may help students to improve their learning patterns and help the

educators to tailor the teaching modules which will match the learning preferences of the students thereby improving the standards of education at dental colleges.
Key words: Learning styles, Academic performances, dental students

Introduction

Dentistry is not only a science of factual knowledge about oral health and disease, rather it is a systematized knowledge of the oral cavity and disease, which is so intricate, so vast and comprehensive.Learning of dental subjects is a very challenging task for dental students. Dental students have dual responsibility of learning preclinical-clinical procedures, and acquiring the theoretical knowledge of basic and clinical subjects. Undergraduate dental education needs ongoing improvements to meet the changing demands of dental practice in the 21st century.

One of the reasons for students' frustration towards the curriculum is inconsistency between learning content and instructor's teaching methods.[1] various strategies are being introduced and practised in dental colleges with the purpose of facilitating students to become better dentists in future. One of them is to identify the learning preferences of the students. Learning preference can be defined as the most effective and efficient modality or manner in which a learner has a natural preference to perceive, process, store and recall new information.[2] There has recently been widespread interest in the evaluation of learning technique since its adoption .Each student learns in different ways and this affects their performance.

In dental education, the emphasis on covering a fixed syllabus, often extensive in a limited period with the time tested method of didactic lectures provides little scope for assessment of learning styles. With the growing interest in newer teaching and learning methods worldwide, it is an opportune moment to change the age old teaching styles with due diligence.

A learning style describes a process or preference and is considered an umbrella term covering a spectrum of modalities, preferences, and strategies.[3] James and Gardner defined learning preferences as the manner in which, and the conditions under which, learners most efficiently and effectively perceive, process, store, and recall what they are attempting to learn.[4] Learning preference is considered a component of the wider concept of personality. One learning style is neither preferable nor inferior to another but is simply different, with different characteristic strengths and weaknesses.[5]

There are different techniques for determining learning styles, the latest is the visual-aural-read/write-kinesthetic (VARK) learning styles questionnaire. VARK model addresses part of the learning styles that is often subjected to self-modification and it is accompanied by study strategies for each style. This questionnaire was developed by Fleming at Lincoln University New Zealand, in 1998.[6] This approach categorizes students into four classes according their interaction and response to learning environment: 1. Visual (V): learners who learn better through seeing visual educational material (diagrams, figures and pictures) with

explanation; 2. Aural (A): learners who learn better through hearing and verbal teaching (listening to the lecture and explanations); 3. Read/ write (R): learners who learn better if they take notes during the lecture or while reading written or printed material; 4. Kinesthetic (K): learners who learn better when they perform practical and experiential tasks and object manipulation by physical processes.[7]

The learning style information can benefit the students as it would help them in formulating the appropriate learning strategies for enhancing their learning.[8] Developing knowledge of different learning styles among the student population is still important in designing curricula, and adopting teaching methods to promote student learning and develop the deep learning skills needed for lifelong. Teachers can utilize this knowledge to facilitate student learning and preparing their lesson plans.

Hence, the purpose of this study was to assess the learning style preferences of undergraduate dental students of Hazaribag city using VARK questionnaire version 7 and to assess the learning styles based on past academic performance.

METHODOLOGY

The present study is a cross sectional survey. The study proposal was approved by the Institutional review board of HazaribagCollege of Dental Sciences and Hospital, Jharkhand. The sampling frame comprised of undergraduate dental students ofHazaribag college of dental sciences and hospital. The study was conducted at the premises of the college after obtaining permission from the college principal. Out of 400 students who were approached to participate in the study (convenient sample) 377 students participated with 94.25% response rate. The study sample comprised of 1st year, 2nd year, 3rd year, final year and interns of the dental college. The purpose of the study was explained to the students using a participant information form and written informed consent was obtained before the administration of VARK questionnaire. Data was collected using a self-designed proforma and VARK questionnaire version 7.1. Data regarding participant's name, college, age, year of under graduation and past academic performance was collected.

Administration of VARK questionnaire

VARK questionnaire version 7.1 developed by Neil Fleming was used.[15] Satisfactory levels of reliability and validity of the VARK have been reported using factor analysis techniques.[16] VARK questionnaire comprised of sixteen multiple-choice questions with four answer selections corresponding to the four sensory modalities.

VARK questionnaire was distributed to students in their respective classrooms in their college and students were given 30 minutes time to complete the form. No interaction was allowed among the participants while they answered the questionnaire. The completed forms were collected on the same day. Incompletely answered questionnaires were not considered for data analysis. The respondents were allowed to select more than one answer to each question, which was

necessary for the identification of the poly modal modes of learning.

Scoring of questionnaire

The questionnaires were scored and tabulated to determine the distribution of VARK preferences. Preference rankings were calculated by totalling all "V" responses (visual), all "A" responses (aural), all "R" responses (read/write), and all "K" responses (kinesthetic).

Data analysis

- The collected data was reviewed, organized, tabulated and subjected to statistical analysis by using SPSS software 23.
- Standard descriptive statistics were generated in terms of percentages.
- Chi-square test was used to assess the association between learning style preferences and past academic performance. Significance level was set at $p \leq 0.05$

RESULT

The present study was conducted to assess the learning style preferences and past academic performance of undergraduate dental students of Hazaribag city. Totally, 377 undergraduate students participated in the study.

Subjects were divided based on their learning styles as V(visual), A(Aura), R (Read/write) ,K (Kinesthetic), bimodal (VA,VR,VK,AR,AK,RK), trimodal (VAR, VAK,VRK, ARK) and quadmodal(VARK) learning style preferences and likewise the academic performance were classified into first class(65-75%), second class (50-65%) , distinction (>75%) and fail. The data obtained from the study was subjected to statistical analyses.

The distribution of undergraduate dental students based on learning style preferences.Majority of undergraduate dental students were polymodal (73%) with bimodal type being predominantly prevalent (35.5%),followed by trimodal (20.4%) and quadmodal (17.2%).27% of students were unimodal with kinaesthetic type being predominant(13.3%) followed by aural (7.7%),verbal (3.4%) and read and write (2.4%).

The distribution of first year dental students based on learning style preferences. Majority of the first year dental students preferred trimodal type of learning (33.3%) followed by bimodal(30%) and quadmodal (15%).very few belonged to other types like kinaesthetic (8.3%),visual (6.7 %),read and write (5 %)and aural (1.7 %).

The distribution of second year dental students based on learning style preferences. Majority of the second year dental students preferred bimodal type of learning (34.7%) followed by trimodal (22.1%) and quadmodal (20%).Remaining belonged to unimodal type of learning(23%).

The distribution of third year dental students based on learning style preferences. Majority of the students had preference for bimodal type of learning (33.7%) followed by trimodal(20.2%) and kinaesthetic (16.3%).others had a preference for quadmodal (14.4%),aural (10.6%)and visual (3.8%).

The distribution of final year dental students based on learning style preferences. bimodal (36.6%),quadmodal(21.1%) and kinaesthetic (23.9%) types of learning were predominantly prevalent among final year

dental students. Very few belonged to other categories of learning.

The distribution of interns based on learning style preferences.Bimodal (48.6%), quadmodal (14.9%) and trimodal 21.3%) types of learning were predominantly prevalent among interns. Very few belonged to other categories of learning.

The distribution of undergraduate students based on learning style preference and past academic performance Among students who preferred visual type of learning, majority students had secured first class in their previous university exam and there were no distinction students in this category. Among aural type, majority had secured first and second class. In the read and write category, there were only first and second class students. In the kinaesthetic group, majority had secured first class and second class. In bimodal category, majority were first and second class students. The number of distinction students in this category was high compared to other categories of learning. In the trimodal group maximum students had secured first class and second class.In the quadmodal group, majority of students had secured first and second class.There was no significant association between learning style preferences and past academic performance ($p = 0.9$)

DISCUSSION

The present study used the validated VARK questionnaire version 7.1 to determine the learning preferences of undergraduate dental students in Hazaribagcity and to investigate which style was predominant among the students and whether there was any association between learning styles and past academic performance.The purpose of this study was to determine the learning style preferences of dental students to improve the dental education standards in the institutions.

Most of the students preferred multimodal learning style.Similar findings have been reported among undergraduate dental students .[9,12-14]In dental education students have to remember as well as conceptualize knowledge. The curricula is spread across various didactic lectures,hands on sessions and practical demonstrations. Perhaps this is the reason for mulitimodal type of learning being predominant. However a study done in India among dental students showed that majority had unnimodal learning preferences with read and write being predominant.[11]Another study done among the dental undergraduate students of Islamabad clearly demonstrated that students preferred kinesthetic and aural learning at a higher percentage.[17]These contrary findings point out that a variety of factors can influence students' learning approaches. Factors like age, gender intelligence, level of persistence, culture and creative thinking are few which may influence the preference for learning style.[18]

Another important finding of this study was that there was no association between learning style preferences and past academic performance. A study done among dental students in India showed similar finding.[9]A similar study done among medical undergraduate students in India showed that learning style preference was not influenced by academic performance [13]however, a statistically significant association was found between the academic performance

and learning style preferences in a study done among first year dental students in Saudi Arabia .[10]Past academic performance is often used as a predictor of current or future performances .[19]

Dental students are a part of population of adult learners who come into professional school with different styles of learning acquired through many years of study. A better understanding of learning styles by the faculty can help reduce the students' level of frustration and improve teaching methods. When students' awareness level of their preferred learning modality is raised, it can improve students' learning outcomes and help them to actively cope with the academic demands of dental school.[20]

A simple intervention such as administering a learning style inventory can lead to improved learning outcomes and can make the journey of dental education interesting both for educators and learners. Faculty members who are consciously aware of their students' learning styles as well as their own are in a position to make more informed choices in course material design, and learning processes that broaden the opportunities for effective learning in their courses. [21]

In the present study, students were informed that the learning preference results provided were a method of self-knowledge and were not intended to label them to a certain mode of learning. Knowing one's learning style can be beneficial if learners take the next step and consider how and when they learn as part of a reflective, metacognitive process, with action to follow. [3]

In contrary to this, Stellwagen has warned against misapplication of learning style inventories that may lead to stereotyping and prejudicial labeling of individuals. Learning preferences, like other individual characteristics, should be viewed as a continuum. Some dental students may undergo a shift in learning preferences as the learning environment changes from lecture hall to preclinical laboratory to patient clinic.[22]

When learning styles do not fit the task, learning inventories may help realize the preference of learning and make the task easy. If variety of teaching methods and styles are used then learners are exposed to familiar ways of learning that provide comfort during the process, ultimately giving the learners multiple ways to excel.[23]

There are several methods to assess the learning styles. VARK questionnaire developed by Neil Fleming is characterized by simplicity and availability online in different languages. Satisfactory levels of reliability and validity of the VARK have been reported.[16]However, VARK is not a complete learning style inventory but rather provides basic sensory preferences.[17]

The present study has limitations. The sample was convenient sample of students from two dental colleges in the same city hence; sample may not represent the population of dental students across India. Further multicentric studies with larger sample size from multiple institutions are recommended. In addition, longitudinal studies tracking the effect of creating awareness of learning style preferences among students on their academic

performance may throw some insights towards improving dental education.

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