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Medical student's preferred learning style

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Abstract:

Objective: To identify the preferred learning style of first year medical students at Karachi Medical and Dental College, Karachi.

Material and Methods: A descriptive cross sectional study was conducted amongst first year medical students of Karachi Medical & Dental College, Karachi. VARK questionnaire was used to determine the learning style. Ethical approval was granted by the ethical committee of KMDC.

Results: A total of 210 students participated in study. Completed questionnaire were returned by 199 students with response rate of 94.7%. Majority of study group comprised of women 86.94%(173) while men accounted for 13.06%(26). Male to female ratio was 1:6.65. Most preferred individual VARK learning style was kinesthetic(95.47%) followed by auditory(80.40%), visual(70.85%) and reading/writing(57.28%). Multi-modal learning style was preferred by 98.5% with Tri-modal as the most preferred combination comprising of 51.26% followed by Quad-modal 27.14% and Bi-modal 20.10%. Most prevalent Tri-modal combination among study group was KAV (Kinesthetic-Auditory-Visual) with frequency of 50.98%. Uni-modal was the least preferred style of learning comprising of 1.5%. No statistically significant difference of learning style was found between men and women (p=0.195). Kinesthetic was found to be the most preferred individual VARK style with mean score of 6.51±2.47.

Conclusion: Majority of medical students irrespective of gender prefer to learn through using all sensory modalities. Better understanding of learning characteristics of students necessitates modifications in teaching strategies. Using multisensory approach of teaching through use of active learning strategies helps in better understanding and effective learning to take place.

Keywords: Learning style, medical students, instructional strategies, effective learning.

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Introduction:

During the recent years, medical education has become more students centered. The content of syllabus of medical education is enormous. This mostly affects the first year medical students who face a sudden increase in the volume of content they have to learn. Learning style refers to the process by which students, most effectively perceive, process, store and recall what they have to learn.[1] Learning takes place according to student's preferred method of learning. Learning is improved if the learner knows the way they learn.[2] Instructional methods used by the teacher also have an impact on student's learning.[3] Hence, it is important that the instructor is aware of the ways their students prefer to learn. The teaching strategies employed by teachers in most medical colleges in Pakistan are lectures. However, it is established that all students do not have the same learning style and they prefer to learn through different modes. Teaching strategies in accordance to student preferred learning style makes learning easier and thus results in improved learning and more student satisfaction. The sensory modalities through which students prefer to learn are visual, aural,

reading/writing and kinesthetic.[4] Neil Fleming developed VARK (Visual, Auditory, Reading/writing and Kinesthetic) questionnaire to identify the sensory modalities adopted by the students.[5]The learners are categorized as visual, auditory, reading/writing and kinesthetic learners. Visual learners prefer to learn through seeing, auditory learners learn through listening. Reading/writing learners find learning in textual material. Kinesthetic learners involve learning through touching and physical involvement.

Students may use one or more learning strategies.[6] In view of different learning styles of students, there is a need for teachers to adopt different teaching strategies.[7] Shifting of teaching strategies according to student's preferred learning style has been reported to result in improved student performance.[8] Many studies have been done to find the students preferred learning style; however, no such study had been conducted in our institute. This descriptive study was designed to identify the learning style of our first-year medical students so that the teachers could be advised and supported to use related teaching strategies.

Material and Methods:

The study was conducted at Karachi Medical & Dental College (KMDC), Karachi from February 2017 to March 2017. VARK questionnaire version 7.8 was administered to first-year medical students of KMDC; Karachi after their classes had started.[9] Information regarding age and gender was also collected. Information sheet regarding purpose of study was provided to the student and consent taken to participate in the study. The study was reviewed by the ethical and scientific review committee of KMDC, Karachi. The study was deemed compliant with all ethical requirements, and was granted approval by the Committee. The VARK questionnaire was then administered to 210 students who were present in the class after the end of lecture. Purpose of the study and confidentiality was explained to participants through the information sheet provided with the questionnaire. The students were requested to handover the completed questionnaire to the investigator. A total of 199 students returned the completed questionnaire. VARK questionnaire consists of 16 multiple choice questions. Each question has 4 answer statements. The students were instructed to circle the answer that suits them. They were also informed to circle more than one answer for each question if they find it more appropriate. Similarly, they were also informed that they are allowed not to mark any answer at all for a question if they think that does not suit them. Each question is so designed to place the respondent in a different learning situation. Each answer of the question reflects a different learning style. Based on the students answer, the score of individual learning style was calculated to find the learning style preference. Nasiri Z et al. described the procedure to find the preferred learning style of the students in their study conducted on dental students of Babol University of Medical Sciences.[10] In order to find the preferred learning style, four groups were formed according to total scores of each questionnaire in ascending order. Group 1, 2, 3 and 4 comprised of students having total scores of 10–16, 17-22, 23-30 and above 30 respectively. Each group was further analyzed. In Group-1, scores of each learning style was calculated and learning styles whose score was found to be 2 or less were omitted. In Group-2, the scores of learning styles 3 or less were omitted. In Group-3, learning styles having score 4 or less were omitted. In Group-4, learning styles of score 5 or less were omitted. After omitting the learning styles according to criteria set, the remaining learning style/styles were the preferred learning style/styles of every student. The students were termed Uni-modal or Multi-modal if they had preference for one or more than one style of learning respectively. Muti-modal learners were further categorized as Bi-modal, Tri-modal and Quad-modal. Bi-modal learners have two learning style preference. Tri-modal learners have three styles of learning. The Quad-modal learners show preference for all four learning styles.

Data analysis:

The learning style of each student was determined using the VARK questionnaire scoring

Table-1: Basic characteristics of study population

	Gender	
Age (in years)	**Male**	**Female**
18.41±0.68	26 (13.1%)	173 (86.9%)

Table-2: Preferred learning style modals

Learning style modal	**Number**
Uni-Modal	3 (1.5%)
Bi-Modal	38 (19.1%)
Tri-Modal	104 (52.3%)
Quad-Modal	54 (27.1%)
Total	199
Preferred learning Style	
KARV	54 (27.1%)
KRV	17 (8.5%)
KAV	52 (26.1%)
KAR	30 (15.1%)
ARV	5 (2.5%)
KV	14 (7%)
KR	4 (2%)
KA	15 (7.5%)
AV	1 (0.5%)
AR	4 (2%)
K	3 (1.5%)
Total	199

**Data presented as Mean±Standard Deviation & frequency (percentage)*

K= Kinesthetic, A= Auditory, V= Visual, R= Read/Write

Table-3: Comparison of learning style with respect to gender

	Gender			
Learning Style Preferences	**Male**	**Female**	**Total**	**p-value**
Uni-Modal	1	2	3	0.195
	3.8%	1.2%	1.5%	
Bi-Modal	8	30	38	
	30.8%	17.3%	19.1%	
Tri-Modal	11	93	104	
	42.3%	53.8%	52.3%	
Quad-Modal	6	48	54	
	23.1%	27.7%	27.1%	
	26	173	199	
	100.0%	100.0%	100.0%	

**Kendall's tau-b test applied to see the significance*

chart.[9] Data was analyzed through the software statistical package for social sciences (SPSS) version 20.0. For qualitative variables frequency and percentages were calculated. For continuous variable Mean±SD were used. One way ANOVA and Kendall's tau-b test were applied to determine the significance between VARK score with respect to different variables. P-value ≤ 0.05 was considered to be statistically significant.

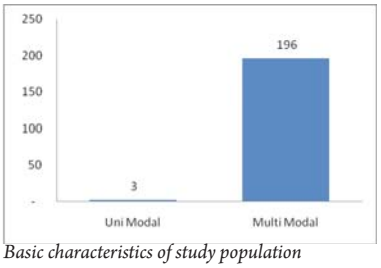

Figure-1: Basic characteristics of study population

Results:

A total of 210 questionnaires were distributed among the students with response rate of 94.7%(199). Basic characteristics of study population are presented in Table-1. Mean age of students was found to be 18.41±2.5. Female were 86.9%(173) while rest were male with male to female ratio of 1:6.6.[5]

Multi-modal was the most preferred learning style comprising of 98.5%(196). Only 1.5%(3) students had Uni-modal learning style (Figure 1). All Uni-modals were Kinesthetic Learner. VARK individual score was separately noticed. Kinesthetic(K) was the most preferred individual style with mean score of 6.51±2.47 followed by Auditory(A) 5.33±2.54, Visual(V) 4.24±2.16 and Reading/writing(R)3.80±2.08. Tri-modal combination was the most common (52.3%) preferred learning style of multi-modal learners followed by quad-modal (27.1%) and then bi-modal (19.1%). Among tri-modal students, Kinesthetic-Auditory-Visual (KAV) was preferred by 26.1%, Kinesthetic-Auditory-Read/Write(KAR) by 15.1%, Kinesthetic-Read/Write-Visual(KRV) by 8.5% and Auditory-Read/Write-Visual(ARV) by 2.5% students (Table-2). Learning style modals were also compared with age. There was no significance difference found when learning style modals compared with age because mean age was approximately same in each modal (p-value=0.120). When learning style was compared with gender, Quad-modal learners among female were 27.7%(48) and male were 23.1%.[6] Preference of Tri-modal in fe-

male were 53.8%(93) and male 42.3% (11). No statistically significant difference found between gender in comparison to learning style modals (p-value =0.195) (Table-3).

Discussion:

Particular mode of learning preference of students is identified by use of VARK questionnaire. Beside VARK, other learning inventories like Learning Style Questionnaire (LSQ), Kolb learning style inventory and Honey and Mumford's learning style questionnaire are also being used in different studies[11-13]. VARK questionnaire is widely used not only because of its simplicity and free availability but also due to its validity and reliability[14-17]. VARK questionnaire was administered to first year medical students to determine their preferred learning style. Response rate was 94.7%. Majority (86.9%) of respondents of our study comprised of women. The work of Lujan HL et al. and Urval RP et al. have shown no gender differences on learning style preference as has been exhibited in our study where no statistically significant difference (p-value=0.195) found between gender in comparison of learning style modals[8,17]. Similar result was demonstrated in the work of Nasiri Z et al. where no difference of learning style preference was found among gender[10]. However few studies have shown significant relationship between gender and learning style preference.[18] Learning style preference of students has also been compared with academic achievements. In study of Lujan HL, the multi-modal learners have shown to have better academic result over uni-modal learners.[8] However results of several other studies have demonstrated no significant association between learning style and academic result or performance.[10,13,17]

Beside different results of relationship of learning style preferences with gender and academic performance, large number of national and international studies have demonstrated that medical students prefer to learn by using all sensory modalities. In study conducted by Lujan et al. on first year medical students of Wayne State University School of Medicine, 63.8% preferred multiple modes of learning.[8] Another study conducted by Urval RP et al. at Kastubra Medical College, Karnatka India demonstrated 68.7% of second year medical students to be multi-modal.[17] The work of Kharb P et al. on first semester medical students of SMS & R Shardha University India showed multi-modal preferred style by 61% of students.[18] Multiple styles of learning is reported as the major style of learning of first year medical students (67.5%) of University of Colombo.[19] In another study conducted at Isfahan University of Medical Sciences, Iran by Sarabi-Asiabar A et al. demonstrated preference of 51% students for multiple learning style.[20] Study conducted by Daud S et al. at Lahore Medical & Dental College, Pakistan showed 69% students from first to fourth year to be multi-modal.[21] In multi-centre study involving students of six medical colleges in Pakistan by Chaudhary MH et al. reported majority (72.4%) of them to be multi-modal.[22] Results of our study are similar to findings of other national and international studies showing majority (98.5%) of medical students to be multi-modal learners.[8,17-22] Students also possess different attitudes about teaching and learning. Instructional practices and classroom environment have important implications on learning. In studies conducted by Antepohl W et al. and Michel MC et al, problem based learning methods were preferred over lectures by the students.[23-24] In another study, lecture was the preferred teaching strategy among female students.[18] In our study, Kinesthetic was the most preferred learning style of the students. Similar results were revealed in study conducted by Kharb P et al. which demonstrated kinesthetic as the most favored learning method by the students.[18] Better understanding of learning characteristics of students necessitates modifications in teaching strategies. In view of multimodal learning style of medical students, there is a need to adopt multisensory approach of teaching. Active learning strategies like use of models, simulations, demonstrations, discussion, collaborative testing, debate, games, role plays etc. involve all type of learners. Knowledge of student learning preferences helps teachers to adopt teaching strategies according to student's preferred learning style. Use of active learning

strategies improves thinking, reasoning, problem-solving, and decision-making skills in students. Teaching-learning strategies tailored to meet the students' learning preferences would create an effective learning environment for all students.

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Role and contribution of authors:

Dr. Shama Mashhood, conceived the study, literature search, interpretation of the result and writing the first and final draft of the manuscript

Dr. Mashhood-uz-Zafar Farooq, conceived the study, literature search, interpretation of the result and writing the first and final draft of the manuscript

Mr. Muhammad Faisal Fahim, was involved in analyzing the data and review of the manuscript

Ms. Maria Khan, contributed in data collection

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