Role of Red Cell Indices, family history of Diabetes Mellitus and daily exercise influence on Academic performance of Undergraduate Medical students

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ABSTRACT

Aims and Objectives: Our study is aimed at analyzing the influence of Red Cells Indices (RCI), Family history of Diabetes Mellitus(DM) and daily exercise on academic performance of undergraduate medical (UG) students.

Materials and Methods: A cross sectional study approved by Institutional Ethical committee done in 100 UG medical students. 3 ml venous blood was collected and the values of Red Cell Indices were recorded. A questionnaire was given to all subjects with questions on family history of DM, involvement in physical activities and academic scores.

Results: Of 100 UG medical students, abnormal RCI was seen in 29.40% of girls and 2.04% of boys. Students who are involved in daily exercise (73.68%) were found good in academics. 72.07% of anemic girls are with below average academic performance.

Conclusion: Academic performance of UG medical students is positively influenced when RCI are normal, Family history of DM is absent and daily exercise is performed.

Keywords: Academic Performance, UG Medical students, Red cell indices, Diabetes mellitus

INTRODUCTION

Undergraduate medical education in India is facing new and multi-factorial challenges. Medical Education is the back-bone for the successful medical practice. Government of India and medical councils are taking initiatives actively to improve the medical education through new and innovative means like use of high-end technology for academic activities.However, looking at the other end of the story, what the medical students need to perform good during their preclinical years in medical education and their health and life-style affects their academic performance.

Quality of clinical practice is strongly associated with poor academic performance in preclinical years. Research around the globe, clearly unearthed that many of those factors which are commonly associated with academic performance like socioeconomic status and regularity in class attendance are "not" linked to academic performance.[1] On the other hand lifestyle components have a major influence on physical and psychological well-being including class attendance, vigilance, attention and learning.[2, 3]

Many researchers have found a relation between physical activity and good academic results.For some Quebec researchers, physical activity is a determining factor which promotes learning. (Kino Québec, 1998), concentration (Laberge et al., 2007), success (Tremblay, 2006) andacademic integration (Degranpré and Paquet, 2006). Research on the subject highlights the need to provide information to youth about their changing biological needs and how to adjust accordingly[4].

Ananya Mandalet al[1] observed in their study 36.66% of UG students of a medical college in eastern India performed poorly. Similarly, in current study, academic performance was poor in 22.00%. Some of the researchers like Brown et al have shown that nutrition indirectly impacts academic performance. In current study most of the anemic subjects were girls and found to show below average academic performance i.e. 72.37%. Large national studies in the developed world found that physical fitness positively and significantly relates to academic performance in young adults. Similarly, current study shows that 73.68% of students with excellent academic performance were involved in daily exercise.

Industrialization leading to Urbanization and consumption of junk food has resulted in an increased lifestyle disorders like Diabetes Mellitus (DM) and Nutritional deficiencies.

Blood is the only component of the human body that shows changes in its morphology, concentration, size and composition due to change in any of the day-to day activities related to lifestyle and physiology. Hematological parameters

specifically Red cell Indices can help identify nutritional Anemias.[5,6] Family history of DM is an indication of inherited traits from parents. Genetic predisposition also needs to be considered, as a high heritability of educational achievement reflects genetically influence traits, not just intelligence[7].

The major strength of the study will be the probable enhancement of Quality of clinical practice as it is strongly associated with poor academic performance in preclinical years. lifestyle components have a major influence on physical and psychological well-being including class attendance, vigilance, attention and learning.

Implication: Research on the subject highlights the need to provide information to youth about their changing biological needs and how to adjust accordingly.

STUDY OBJECTIVE

To study the effect of Red cell Indices, Daily Exercise and Family History of Diabetes Mellitus on the academic performance of Under Graduate Medical Students.

MATERIALS & METHODS

A cross sectional study was conducted on 100 first year under graduate medical students. The study first approved by the institutional ethical committee of the medical college and then conducted with prior informed consent taken from the participating student subjects as well as the principal of the college. The subjects were thoroughly explained all the modalities and objectives of the study prior to giving consent.

The study has been designed with scientifically validated inclusion Criteria where the subjects with age group of 19-21 years duly verified from their date of birth provided in their respective admission card.

Hostel dwellers were excluded from the study to retain parity in subject selection as well as to maintain their diet pattern uniformity. Those subjects who were reported to be unwell during the last 4 weeks and those who are currently on any medication were exempted from the study.

All the subjects were registered for sample collection and 3 ml venous blood from each was collected in EDTA (potassium) containers. Samples were labelled following scientific protocol and sent to Hematology lab of Pathology Department. The laboratory well-equipped with automated analyzer – HORIBA(sport) which was recalibrated before being used for the study samples analysis. The values of Hb (Hemoglobin), MCV (Mean Corpuscular Volume) , MCH(Mean Corpuscular Hemoglobin), Hct (Hematocrit), MCHC (Mean Corpuscular Hemoglobin Concentration) were recorded. Next day the results of hematological investigations were conveyed to the subjects and those found anemic were referred to General medicine department for further management.

The 100 subjects were divided into anemic and normal according to their Hemoglobin levels as recorded. The cut off value for determination of anemia is blood Hb concentration <12 gm/dl. For the study purpose, severity of anemia based on WHO criteria, as taken by Manjula et al who studied prevalence of anemia in Undergraduate students of a Medical College in Kerala[8].

A scientifically tested predesigned questionnaire was circulated to all the subjects with family history of Diabetes and involvement in physical activities like daily exercise and sports. Family history of DM was defined as having at least one first degree relative with DM as per Masaru Sakurai et al[9].

Information regarding the physical activity of subject is collected from questionnaire as single answer of yes/no. Marks secured in 10thclass , +2 or Intermediate and end of semester-examination in first year conducted by college were recorded in the questionnaire. Since the students had a combination of subjects so to bring in parity in assessment, the percentage of average of total marks scored by students were taken into consideration to rule-out any bias.

1. Classification of subjects as per gender and family history of DM.
2. Classification based on Red cell Indices as per Manjula V. D. et al8.
3. Academic status of subjects categorised as follows:

i. Anaemic/non anaemic.

ii. With Family history of DM/ without Family historyof DM.

iii. Physically active/ sedentary life-style.

RESULTS

Out of total 100 UG medical students,51 were girls and 49 were boys, age range was between 19-21 years and mean age was 20 years.

In our study,19 out of 100 fall into grade A based on their academic performance of those 68.42% are girls and 36.84% are boys. The inference is that the greater part of A grade students (excellent performance in academics) were girls i.e. 68.42% while in D grade i.e.22 out of 100 students with poor academic performance percentage of girls(50%) and boys(50%) are equal.(Table no.1)

Anemia is a condition where amount of Hb is below normal level or there are fewer RBC's than normal.[10] In our study,29.4% girls had reduced Hb and Total RBC count i.e.,15 out of 51. On the other hand, boys who had reduced Hb and total RBC count are only 2.04% i.e.1 out of 49(Graph no.1). Hb =12gm/dl in female age group > 5 years according to WHO standards is defined as Anemia.[4]

According to WHO criteria, severity of anemia is classified into 3 categories[11]: Mild (Hb range 10gm/dl to the cut off),moderate (Hb range 7-9.9gm/dl) and severe (Hb range <7gm/dl).

"Our analysis pointed out that gender is significantly associated with anemia and females are more anemic than males."

As most of the subjects with anemia were girls we have studied their academic performance in relation to their nutritional status.36.36% of girls with anemia fall into grade D and 35.71% into grade C i.e., below average academic performance. (pie diagram-1)

When mean values of MCV,MCH,MCHC and Hct are compared to the academic performance,there is no significant relation(graph no. 2) but when results were studied on individual basis of low and high ranges, there are some interesting findings. Most of the students with low MCV,MCH and Hct. Fall into grades C and D i.e, below average academic performance(Table no. 2).

Family history of diabetes mellitus in relation to academic performance:

The participants positive for family history of DM are those with first degree relatives i.e. parents and siblings etc. as per M Sakurai et al.[9] Number and percentage distribution of subjects with positive family history of DM and with negative history in each grade are taken separately and studied in relation to their academics.

Our study shows no significant relation between family history of diabetes mellitus and academic performance when studied individually(Graph no.1).

Lifestyle and Academic Performance:

Physical fitness scores significantly and positively relate to academic performance in teenagers.[12,13,14,15] In our study, subjects who are involved in daily exercise are performing well in their academics i.e., they fall into grades of A and B of our study.(graph no.2)

Table 1: Showing different grades

Students into various grades based on their academic performance.

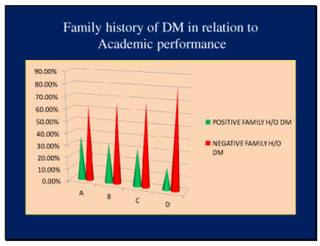
GRADE	NO.OF TOTAL STUDENTS	NO.OF GIRLS	NO.OF BOYS
A	19	13 (68.42%)	7 (36.84%)
B	27	13 (48.14%)	14 (51.85%)
C	32	14 (43.75%)	18 (56.25%)
D	22	11 (50.00%)	11 (50.00%)

Table 2: Distribution according to parameters

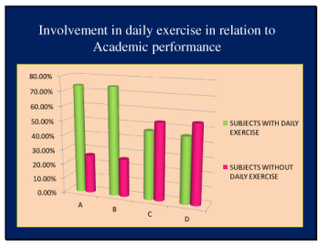
Distribution according to Hematological parameters

		A (19)	B (27)	C (32)	D (22)
MCV	Low	2	2	7	2
	High	1	0	1	1
MCH	Low	4	2	6	3
	High	1	0	1	1
MCHC	Low	2	0	0	0
	High	0	2	2	0
Hct	Low	3	2	2	5
	High	1	0	0	0

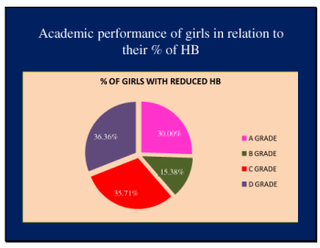
Graph 1: Showing family history



Graph 2: Showing involvement of daily exercises



Pie diagram 1: Showing academic performance



DISCUSSION

Nutrition is the factor that impacts almost every aspect of anybody's life. Nutrition impacts academic performance directly as well as indirectly as poor nutrition leaves students susceptible to illness and increased absenteeism. Healthy food is the first and foremost requirement not only to enhance health but also the prevention strategy for infections and other related illness. Increased access to healthy food and improved nutrition positively impact student's academic performance. Lifestyle interventions in youth may be promising to achieve cognitive benefits and effect academic development. Research categorically proves that Vitamins are important for neuronal developments as well as connectivity. Neuronal signal processing and transmission, which are vital processes for academic performance, are also dependent on nutritional status.[4]

Ananya Mandal et al[1] observed in their study 36.66% of UG students of a medical college in eastern India performed poorly. Similarly, in current study, academic performance was poor in 22.00%.

Study conducted by K E Medani et al[10] unearthed that UG medical students in Sudan showed reduced Hb was 4.6% in males and 36.6% in females. Shah Mohammad Abbas et al[3] a study in UG medical students in Lucknow highlighted 38.46% girls anaemic in contrast to only 18.35% boys anemic. Similar are the results from current study, which exposed that 29.41% girls anemic and only 2.04 % boys, providing evidence that gender is significantly associated with anemia.

Study from Lucknow, conducted by Shah Mohammad Abbas et al[3] reported that four parameters i.e. Hb, MCV, MCH, MCHC levels were significantly different in anemic and non-anemic subjects considering both genders. However, Manjula V D et al[8] showed that Hb, MCV, MCH and MCHC were significantly low in anemic subjects as compared to non-anemic UG students of Government Medical College, Kottayam, Kerala. Current study also highlights similar variations are found in all the Red Cell Indices in anemic and non-anemic subjects.

Nutritional status is the major determinant of anemia. Therefore researchers have concluded categorically that nutritional status plays an important role in academic performance[3]. Some of the researchers like Brown et al[11] have shown that nutrition indirectly impacts academic performance. In current study most of the anemic subjects were girls and found to show below average academic performance i.e. 72.37%.

Any kind of physical activity promotes learning, concentration and success. In the present study 59% of UG medical students were found to be involved in daily exercise. Large national studies in the developed world[12-15] found that physical fitness positively and significantly relates to academic performance in young adults. Similarly, current study shows that 73.68% of students with excellent academic performance were involved in daily exercise. While only 26.31% of students, without daily exercise routine have exhibited excellent academic performance.

Family history of diabetes is a static risk factor and is significantly associated with incident risk of diabetes. In our study, 70% of subjects were found with negative family history of DM, which is similar to study by Masaru Sakurai et al[9] and 82 % subjects were without family history of DM. In a study on young Japanese students with family history of DM only 27.73% were found to be involved in daily exercise.

In current study those with excellent academic performance 15.79% were with Family history of DM and all of them did not involve daily exercise and are anemic. While 84.21% were without family history of DM, they involved in daily exercise and had red cell indices within the normal range. Therefore insufficient physical activity and family history of DM and Red cell indices are jointly correlated to academic performance.

CONCLUSION

The results of analysis of interconnections between the influence of red cell indices, family history of DM and lifestyle on academic performance of UG medical students shows that Academic performance of UG medical students is positively influenced when RCI is normal, Family history of DM is absent and when daily exercise is performed.

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