

Original Research Article

Effect of lifestyle modification on level of serum electrolytes and minerals of young medical students

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ABSTRACT

Background: Adolescence and young adulthood are generally considered as healthy times of life but available evidence indicates that young people are now more prone to a number of health problems particularly those in professional courses like medical and engineering. They face the stress of modern education system and the changing life styles of modern India like fast food and addictions.

Methods: To find out the effect of food habits and addiction on young medical students, 100 healthy students were selected from 2nd year batch of 150 students of I.M.S. and S.U.M. Hospital, Sikhya O. Anusandhana University, Bhubaneswar, Odisha. All these 100 students will be divided into two equal age matched groups of 50 students. One group will be advised to follow some special life style modifications consider to be healthy for 2 months and the other group was left as such and no special interference was done in their lifestyles and no special dietary modification advised to them.

Results: After two months it was found that in the group with life style modifications has significant changes in their Calcium (Ca), Magnesium (Mg) and Phosphorus (P) values before and after studies whereas there was no significant the changes in the values of Sodium (Na), Potassium (K) and Chloride (Cl) are noted with life style modifications.

Conclusions: From the above study it may be concluded that life style modification has certain beneficial effects on the young students to face the stress related with studies in a positive direction by improving electrolytes level particularly Ca, Mg and P.

Keywords: Electrolytes, Life style modifications, Medical students

INTRODUCTION

Although adolescence and young adulthood are generally considered as healthy phases of life but available evidence indicates that young people are now more prone to a number of health problems. The youth of this age group should have a sound physical and mental health in order to perform well throughout the year.¹ Students enrolled in professional courses like medical and engineering are a good example of the youth and adolescent of the time. They basically face all the

challenges that a typical youth of India face. They face the stress of modern education system and the changing life styles of modern India like fast food and addictions.

The pursuit of higher education is expected to be stressful. Stress is a mental and physical condition which results from pressure or demands that strain or exceed your capacity or perceived capacity to cope. Medical education is perceived as being stressful as it is characterized by many psychological changes in students.² Studies have proved that compared to the general population, medical students are the most

distressed students.³ Although some stress is necessary for personal growth to occur, the amount of stress is overwhelming: the student's ability to cope is affected. In one study it was found that medical students were not unduly stressed but the transition of basic to clinical training was associated with stress.⁴ Stress in medical education often exerts a negative effect on the academic performance, physical health and psychological wellbeing of the students.⁵ Academic, social, physical and emotional factors are greater perceived causes of stress in medical students.

The majority of stressful incidents in medical education are related to medical training rather than to personal problems. In a five-year prospective study, students were evaluated in the first year and then in the 4th and 5th year. It was established that those students that were distressed in the beginning were likely to remain so throughout the training period.⁶ It has been observed that medical school environments in India are extremely stressful and have led to suicide and suicidal attempts by the students. The early warning signs of stress in students are anxiety, phobia, depression, suicide and suicidal tendencies, mood alterations, addiction and problems like memory, concentration, and decision making. The lifestyle changes reviewed showed a decrease in sleep, leisure and recreational activities.⁷

Around 1 in 6 persons in the world is an adolescent: that is 1.2 billion people aged 10 to 19. Most are healthy, but there is still significant death, illness and diseases among adolescents. Illnesses can hinder their ability to grow and develop to their full potential. Alcohol or tobacco use, lack of physical activity, unprotected sex and/or exposure to violence can jeopardize not only their current health, but often their health for years to come, and even the health of their future children.

Promoting healthy practices during adolescence, and taking steps to better protect young people from health risks are critical for the prevention of health problems in adulthood, and for countries' future health and social infrastructure.

Lifestyle modification programs consist of a diet high in complex carbohydrate, high in fibre, low in fat and low in cholesterol combined with daily aerobic exercise, primarily walking.⁸ Young generation of present time are oriented to the lifestyle modification methods as it is still considered as a life style of middle age and old people. The long-term benefits of living a healthier lifestyle is the prevention of diseases such as heart disease, stroke and diabetes. According to Mayo-Clinic, these changes can be difficult to be applied in life. Even though one may understand the relationship between eating specific foods and risk for heart disease, it can be difficult to change years of unhealthy eating habits.⁹

Electrolytes are electrically charged minerals that help move nutrients into and wastes out of body's cells,

maintain a healthy water balance and help stabilise the body's acid level. The balance of Sodium, Potassium, Chloride, Calcium, Magnesium and Phosphorus in the blood is a good indicator of how well the kidneys and heart are functioning. Knowing which electrolytes are out of balance can help us to determine a course of treatment.¹⁰ The balance of the electrolytes in our bodies is essential for normal function of our cells and our organs. Electrolytes regulate our nerve and muscle function, our body's hydration, blood pH, blood pressure, and the rebuilding of damaged tissue. Various mechanisms exist in our body that keep the concentrations of electrolytes under strict control. Our muscles and neurons are sometimes referred to as the "electric tissues" of the body. They are reliant on electrolyte movement between extracellular, interstitial and intracellular fluid. All the essential electrolytes should be in normal range to indicate that the person is in good health.

Basically our study was focused on the changes on important serum electrolytes and minerals by changing life style so that a healthy method of living can be determined in these young adults.

METHODS

The study was conducted in I.M.S. and S.U.M. Hospital from January 2018 to June 2018. After due clearance from import export code (IEC) committee of the institution 100 apparently healthy students were selected from 2nd year batch of 150 students of I.M.S. and S.U.M. Hospital, Sikhya 'O' Anusandhana University, Bhubaneswar, Odisha. Students having any form of known disease were excluded from the study. It was also taken care that all students selected must be in the close age range of 18 to 25 years. Informed consent was taken from the participants.

All these 100 students were divided into two equal age matched groups of 50 students. One group (group-II) was advised to follow some special life style modifications for 2 months like: 30 min of any form of aerobic exercise every day, avoid junk food as much as possible and avoid intoxication agents like smoking and alcohol etc.

The other group (group-I) was left as such and no special interference was done in their lifestyles and no special dietary modification advised to them. It was also monitored that any student who deviated from the lifestyle modification programme in the group was excluded from the study at the end.

5 ml of blood was taken from antecubital vein under strict sterile measures in the central laboratory of the Medical College hospital. In the beginning of the study six important electrolytes and minerals e.g., Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Phosphorus (P), and Chloride (Cl) of each student was measured in both the groups. Na⁺, K⁺ and Cl⁻ was

measure by ion selective electrode method in Ecolyte by Roche whereas Ca, Mg and P was measured by COBAS INTEGRA 400 fully automated analyzer by colorimetric method.¹¹

All the biochemical tests were done in the central laboratory of Department of Biochemistry of the institution.

Then after 2 months of the study the electrolytes level of each group was re-evaluated excluding those who left the study in the middle. It was found that 6 students from the 2nd group could not follow the study so they were excluded from the study by the end of 2 months. The changes in the level of electrolytes were compared between before and after the study in each group and also between both the groups by paired and unpaired t test. Any change considered significance when p value <0.05. Software version of SPSS.20 is used for statistical analysis.

The study was presented in front of the ethical committee of the institute and started only after ethical clearance.

RESULTS

In the study all the mean age of group I is 20.9±1.25 whereas the mean age of group II is 20.6±1.27. There is no significant difference between the mean ages of two groups. This was due to the fact that students were taken from the same batch of MBBS. The mean and SD of all the electrolytes and minerals in the study of two groups are also comparable.

In the control group the mean and SD of all the six electrolytes and mineral before the study was as follow Na⁺ 138.2±3.6 mEq/l, K⁺ 4.35±0.45 mEq/l, Cl⁻ 102.3±3.22 mEq/l, Ca 9.41±0.5 mg/dl, Mg 2.16 mg/dl, P 3.84±0.53 mg/dl. Now after two months the above parameters are again re-evaluated and the mean with SD were found as follows Na⁺ 138.3±2.87 mEq/l, K⁺ 4.39±0.43 mEq/l, Cl⁻ 101.9±3.01 mEq/l, Ca 9.39±0.42 mg/dl, Mg 2.21±0.35 mg/dl, P 3.87±0.43 mg/dl. When compared with each parameter before and after two months it was found that the changes in their levels were not significant (p>0.05).

Table 1: Mean values of various parameters of each group.

	Mean age in yrs	Mean Na ⁺ in mEq/l	Mean K ⁺ in mEq/l	Mean Cl ⁻ in mEq/l	Mean Ca in mg/dl	Mean Mg in mg/dl	Mean P in mg/dl
Group-I	20.9	138.2	4.35	102.3	9.4	2.16	3.84
Group-II	20.6	139.3	3.98	101.2	9.1	2.12	3.72

Table 2: Comparison of various electrolytes in group-I before and after study.

	Mean Na ⁺ in mEq/l	Mean K ⁺ in mEq/l	Mean Cl ⁻ in mEq/l	Mean Ca in mg/dl	Mean Mg in mg/dl	Mean P in mg/dl
Before study	138.2±3.6	4.35±0.45	102.3±3.22	9.41±0.5	2.16±0.31	3.84±0.53
After 2 months	138.3±2.87	4.39±0.43	101.9±3.01	9.39±0.42	2.21±0.35	3.87±0.43
t value	0.23	1.08	0.88	0.59	1.54	0.75
p value	0.82	0.28	0.38	0.56	0.13	0.45

Table 3: Comparison of various electrolytes in group-II before and after study.

	Mean Na ⁺ in mEq/l	Mean K ⁺ in mEq/l	Mean Cl ⁻ in mEq/l	Mean Ca in mg/dl	Mean Mg in mg/dl	Mean P in mg/dl
Before study	139.26±3.34	3.98±0.35	101.16±3.12	9.14±0.44	2.13±0.27	3.71±0.54
After 2 months	139.39±3.56	3.99±0.34	101.29±2.69	9.55±0.4	2.35±0.33	4.04±0.44
t value	0.15	0.34	0.33	8.62	5.33	3.46
p value	0.88	0.73	0.74	<0.001	<0.001	0.001

It was found that in the group-II the beginning of the study the mean and SD of various study parameters as follow Na⁺ 139.3±3.34 mEq/l, K⁺ 3.98±0.35 mEq/l, Cl⁻ 101.2±3.12 mEq/l, Ca 9.14±0.44 mg/dl, Mg 2.13±0.27 mg/dl, P 3.71±0.54 mg/dl. Now after two months of life style modifications all the parameters are again re-evaluated and they come as follows Na⁺ 139.4±3.56 mEq/l, K⁺ 3.99±0.34 mEq/l, Cl⁻ 101.3±2.69 mEq/l, Ca 9.55±0.4 mg/dl, Mg 2.35±0.33 mg/dl, P 4.04±0.44 mg/dl. So when each parameter was compared before and after

intervention in group II it was observed that changes in the values of Na⁺, K⁺ and Cl⁻ are not significant but the values of Ca, Mg and P changed significantly before and after the study.

DISCUSSION

Proper diet and exercise help to improve mood and reduces anxiety, maintained balanced weight, and most important make the body functions properly. Finding

ways to introduce exercise in one's daily routine is one of the important aspects of living a healthy lifestyle. Taking small walks, doing household works, using the stairs instead of the elevator at work are small but sufficient forms of exercise. So taking small steps to do minor exercise in one's life is better than not exercising at all. Stress management and maintaining social connections are additional components of having a healthy lifestyle. Keeping ties with others as opposed to isolating themselves can also help individuals feel better.

A number of “unhealthy” lifestyle factors like, smoking, excessive alcohol consumption, lack of physical exercise, less fruits and vegetables in diet, exposure to tobacco smoke are associated with chronic disease and premature death. In one study found that a higher healthy lifestyle score was significantly associated with reduced risk of mortality from all causes, as well as from cardiovascular diseases and cancer, specifically women with 4 to 5 healthy lifestyle factors had 43 percent lower risk of all-cause mortality compared to women with a score of zero. The reduction in mortality associated with higher lifestyle scores was strongest for deaths due to cardiovascular disease.¹² In our study also we found that there is a positive effect on the students electrolyte levels particularly calcium, magnesium and phosphorus after stoppage of smoking and consuming alcohol.

Maintenance of lifestyle changes is crucial for substantial effects on public health. Indeed, only few multi-factorial intervention trials assessed lifestyle factors over more than twelve months, and fewer measured them after discontinuation of the intervention. Generally, it appears that healthy dietary habits are somewhat better maintained than physical activity; some important large-scale and long-term trials showed sustained effects on diet. One diabetes care trial was successful in producing sustained improvements in both diet and physical activity.¹³ Similarly in our study also use of more fibres in diet, avoiding fast food and regular exercise improves the serum electrolytes.

It was found that beneficial effects of the intervention on physical activity among men remained five years after discontinuation of the intervention whereas among women, no short-term or long-term effects were found. Findings from most of the previous large-scale intervention trials are inconclusive.¹⁴ In our study also the life style modification did not significantly alter all electrolytes. It only alters significantly calcium, magnesium and phosphorus level. Alternatively, women in this multi-factorial lifestyle study may have chosen to focus on changing dietary habits instead of physical activity. Besides, gaining more muscle mass and strength might be a motivating factor that is more relevant for men than for women.

Changes in physical activity and dietary habits found in our study, although significant, were quite small compared to previous trials. However, the small-to-

medium effects achieved in our study may be particularly valuable when thinking in terms of population impact. Although the intensity of the intervention was dependent on the individual risk profile, persons from a general population were included in the study regardless of their baseline outcomes and risk status. Thus, this approach may have reached a less selected group of persons compared to previous large-scale long-term trials that have focused on high-risk person's only.¹⁵

The changes in Ca, Mg and P is most probably due to the fact that green leafy vegetables contain more quantity of minerals so increasing their consumption help to increase their level in blood. Again avoidance of intoxication agents may reduce the oxidative stress and increases the antioxidant status. No changes in Na⁺, K⁺ and Cl⁻ may be due to the fact that these electrolytes are regulated by many other factors and very long period of intervention may require to have any significant change in their level.

CONCLUSION

From the above study it may be concluded that life style modification has certain beneficial effects on the young students to face the stress related with studies. From the study it was found that those who changed their life style in a positive direction have improved mineral levels particularly Ca, Mg and P.

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REFERENCES

1. Sunitha S, Gururaj G. Health behaviours & problems among young people in India: Cause for concern & call for action, *Indian J Med Res.* 2014;140(2):185–208.
2. Abdulghani HM, Alkhanhal AA, Mahmoud ES, Ponnampereuma GG, Alfaris EA. Stress and its effects on medical Students: a cross-sectional study at a college of medicine in Saudi Arabia, *J Health Popul Nutr.* 2011;29:516-22.
3. Lloyd C, Gartrell NK. Psychiatric symptoms in medical students, *Comprehensive Psychiatry.* 1984;25:552-65.
4. Helmers KF, Danoff D, Steinert Y, Leyton M, Young SN. Stress and depressed mood in medical students, law students and graduate students at Mc Gill University, *Acad Med.* 1997;72(8):708-14.
5. Mosley TH, Perrin SG, Niral SM, Dubbert PM, Grothues CA, Pinto BM. Stress, coping, and wellbeing among third-year medical students. *Acad Med.* 1994;69(9):765-7.
6. Guthrie E, Black D, Bagalkote H, Shaw C, Campbell M, Creed F. Psychological stress and burnout in medical students: a 5 year prospective

- longitudinal study. *J ROY Soc Med.* 1998;91(5):237-43.
7. Wolf TM. Stress coping and health. Enhancing well-being during medical school, *Med Edu.* 1994;28:8-17.
 8. Barnard RJ, Hall JA, Chaudhari A, Miller JE, Kirschenbaum MA. Effects of a low-fat, low-cholesterol diet on serum lipids, platelet aggregation and thromboxane formation. *Prostaglandins Leukot Med.* 1987;26:241–5.
 9. Available at: <http://www.livestrong.com/article/289651-what-are-the-benefits-of-living-a-healthy-lifestyle/>. Accessed on 28th May 2019.
 10. Serum Electrolytes. BWH Women's Health at bwhtelesteservices@partners.org; 2011.
 11. Method Manual, COBAS INTEGRA 400/700/800, Edition. Volume 4. 2008: 02.
 12. Nechuta SJ, Shu XO, Li HL, Yang G, Xiang YB, Cai H, et al. Combined Impact of Lifestyle-Related Factors on Total and Cause-Specific Mortality among Chinese Women: Prospective Cohort Study. *PLoS Med.* 2010;7(9):pii:e1000339.
 13. Lindström J, Ilanne-Parikka P, Peltonen M, Aunola S, Eriksson JG, Hemiö K, et al. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. *Lancet.* 2006;368:1673–9.
 14. Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study group. *BMJ.* 1995;310:1099–104.
 15. Hjermann I, Byre VK, Holme I, Leren P. Effect of diet and smoking intervention on the incidence of coronary heart disease. Report from the Oslo Study Group of a randomized trial in healthy men. *Lancet.* 1981;2:1303–10.

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