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Assessment of Influence of Screen Time, Sleep Patterns and Dietary Habits on BMI of Adolescents in Mumbai city.

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Abstract:

Background: Screen time refers to the total amount of time spent viewing a screen related device (eg. mobile, television, laptop, etc.) per day. The recommended screen time is 1-2 hours for adolescents. Adolescence is a crucial phase of physical, mental, emotional and behavorial development in humans. Obesity during this time could have several long term consequences such as metabolic diseases, cardiometabolic disorders, etc.

Objectives: To assess the influence of screen time, sleep patterns and dietary habits on the BMI of adolescents. BMI was used as an indicator for obesity.

Study design: Experimental study. Effect of intervention was seen by comparing the pre and post-test results.

Participants: 100 samples (10-15 years).

Intervention: A pre-test was conducted where subjects filled a questionnaire about their diet, sleep schedule and screen usage. A nutrition education programme was then conducted. Post intervention period of 3 months, BMI was measured again and ssubjects filled a similar questionnaire.

Outcome: Subjects who followed the recommended guidelines by decreasing their screen time, improving their sleep timings and inculcating healthier eating habits in their daily routine were seen to have a reduced BMI.

Result: BMI during the post-test showed an 8% increment in normal weight, 1% decrease in underweight, 5% decrease in overweight and 2% decrease in obese category.

Conclusion: The programme was therefore seen to be educational and beneficial for subjects. It is recommended that such programmes continue being conducted for children of all ages to improve their health and spread awareness about diseases.

Index Terms **- Screen time, sleep, diet, BMI, adolescent, obesity.**

I. INTRODUCTION

Adolescence is the phase during which physical, mental and emotional growth and development occurs and it is crucial to promote healthier habits during this period to have happy, successful and healthy adults in the future. According to several studies, 2 to 18-year-old subjects have diets comprising 40% solid fats and sugars, and only 1/4th of sample size receive the recommended eight hours of sleep on a school night. [1] Three behaviors are especially important to support health into adulthood: eating a nutritious diet, being active, and getting an adequate amount of sleep at night. [2]

Adolescents are growing up immersed in media and use platforms that allow users to consume as well as create content. Screen time refers to the total amount of time a person spends viewing screens of any form. This includes televisions, laptops, mobile phones, tablets and computers. If a child decides to spend the crucial years of adolescence playing online games, watching television, and consuming media content instead of playing outdoor games, involving in activities and refining their motor skills, it has repercussions on their overall health. Greater sedentary time is shown to be directly related to obesity and a greater waist to hip ratio in teenagers. This is usually carried forward even in their adulthood, often culminating in several other problems like cardiovascular

disorders. This is often attributed to lower energy expenditure, along with having adverse effects on the child's sleep patterns. According to the American Academy of Pediatrics, children begin watching television from the age of 4 months as compared to children from the 1970s who watched television only after 4 years of age. A study reported that by age 3, 1/3rd samples had televisions in their bedrooms. Parents play a very important role in helping their children navigate the media by setting expectations and boundaries to make sure their children's media experience is a very positive one. They ought to ensure that screen time does not affect adequate sleep, physical activity and other behaviors essential to health. [3] The technology provided should be used for educational purposes and rarely to for leisurely activities.

Healthy sleep-wake cycles are essential for normal physical and psychological health in humans. Children who are sleep deprived are shown to have more behavioral problems, academic problems, health problems, risk-taking behaviors, and anxiety and mood-related problems. Additionally, lack of sleep can increase their risk of health problems like obesity. [4]

Sleep timing behaviors are also associated with diet quality. Samples who sleep late are shown to have a higher intake of energy-dense, nutrient-inadequate foods, while those who slept earlier consumed more fruit and vegetables. Short sleep duration has been associated with increased consumption of fat and fast foods, in 16 to 19-year-old US adolescents. [5]

Quality sleep is essential for all humans to allow proper health and for functioning well during waking hours. Those between 6 to 12 years of age generally need 10-11 hours per 24 hours and adolescents need an average of 9 hours per 24 hours, though there is some variation from individual to individual. Adolescents have been reported to develop poor sleep hygiene and face trouble falling asleep due to many distractions in their bedrooms. Parents are recommended to not have a television in their bedrooms to warrant reduced screen time and avoid screens from interfering with the quality of sleep. [6]

Adolescents need to express freedom from parental control, which is usually seen to be associated with their eating habits. A study conducted on European children between 6 to 9 years, showed that an additional hour of screen time was associated with the higher consumption of cariogenic foods (soft drinks, flavored milk, potato chips, popcorn or peanuts, candy bars or chocolate, and biscuits, cakes, doughnuts or pies). [7]

II. METHODOLOGY

This studied was carried out on adolescent students from Mumbai city. 100 samples between 10 to 15 years were taken from Guru Harikrishan High School, Santacruz (West). Purposive convenience sampling technique was employed for the selection of all the samples.

Two questionnaires were given to the students to gain insight into their screen time, participation in physical activity, sleeping habits, and dietary pattern. The second one was administered after a period of 3 months. After the pre-test questionnaire was filled by the students, a nutrition education program was conducted for them. Key points discussed during the program include explaining the importance of breakfast to subjects as well as their parents, less time-consuming food ideas were presented to parents, and they were also provided with ways on how to improve the taste and appearance of food. The idea was to make home-cooked meals palatable and easy enough to execute in the kitchen. This was also an effective method to cut the monthly expenses of families that spend a lot on expensive meals, which might be cooked in several unhygienic and unhealthy ways. The subjects were advised to gradually decrease their consumption of tea and coffee. They were recommended to substitute tea or coffee with plain milk, turmeric milk, milk with honey, etc. During the program, the subjects and parents were advised to sleep early and also maintain a regular sleeping schedule. Subjects were asked to reduce their screen time usage for about 1-2 hours before bedtime, and eliminate the use of any of these devices in their bedrooms. They were advised to use the devices in a way that was beneficial to them instead of just wasting time in a derogative manner.

Nutritional anthropometry is a measurement of the human body at various ages and nutritional status levels. Anthropometric measurements such as weight and height were recorded and BMI was subsequently calculated. Height is a linear measurement that reflects skeletal growth. It is composed of the sum of four components: legs, pelvis, spine and skull. Height was recorded for the students using a stadiometer. Bodyweight is generally made up of muscle, fat, bone and internal organs. It is the measurement of the total body energy stores and the changes in weight parallel energy and protein balance. Weight was recorded using the Inbody 120 body composition analyzer to the nearest 100 grams. In body 120 machine was used for collecting the body composition data. Body composition analysis gave basic information on the subject's physical status and gives accurate results. Body Mass Index (BMI) was calculated and classified according to BMI-for-age reference curves issued by the World Health Organization. [8] The outcome variables were classified as follows: Underweight (Less than the 5th percentile), Normal or Healthy Weight (5th percentile to less than the 85th percentile), Overweight (85th to less than the 95th percentile), Obese (Equal to or greater than the 95th percentile).

The research protocol was approved by the SMES Institutional Ethical Committee under Clinical Trials Registry-India (ICMR-National Institute of Medical Statistics).

Statistical analysis: Using the SPSS Statistics software package, the data between pre and post-test was cross-tabulated and compared. Subsequently, paired t-test values were obtained. The samples were classified into 4 categories according to their BMI (Underweight, Normal, Overweight and Obese) and further influence of change in various lifestyle behaviors was observed in samples belonging to each category individually.

III. RESULTS

Table 3.1 shows the paired t-test results between pre-test and post-test frequency of various parameters.

Table 3.1: Paired t-test results between pre-test and post-test.

		N	Mean±SD	t-value	Sig.
Pair 1	BMI (Pre-test)	100	20.51±4.54	0.235	0.018
	BMI (Post-test)	100	19.53±2.79		
Pair 2	Breakfast (Pre-test)	100	2.17±1.22	5.881	0.000
	Breakfast (Post-test)	100	1.40±.84		
Pair 3	Carrying tiffin (Pre-test)	100	1.94±1.14	5.478	0.000
	Carrying tiffin (Post-test)	100	1.27±.69		
Pair 4	Consumption of junk food (Pre-test)	100	2.45±.87	-3.410	0.001
	Consumption of junk food (Post-test)	100	2.79±.72		
Pair 5	Eating at restaurant (Pre-test)	100	2.45±.82	-3.342	0.001
	Eating at restaurant (Post-test)	100	2.82±.79		
Pair 6	Fruit Consumption (Pre-test)	100	2.00±.88	3.912	0.000
	Fruit Consumption (Post-test)	100	1.62±.81		
Pair 7	Tea/Coffee Consumption (Pre-test)	100	2.60±.67	3.772	0.000
	Tea/Coffee Consumption (Post-test)	100	1.92±.22		
Pair 8	Sleep Timing (Pre-test)	100	2.81±.88	3.032	0.003
	Sleep Timing (Post-test)	100	2.52±.85		
Pair 9	Time spent playing digital games (Pre-test)	100	2.57±.998	3.496	0.001
	Time spent playing digital games (Post-test)	100	2.16±.873		
Pair 10	Physical Activity (Pre-test)	100	2.47±.95	4.434	0.000
	Physical Activity (Post-test)	100	1.96±1.01		

Results obtained were quite favorable and most of the changes seen were significant. BMI during the post-test showed an 8% increment in normal weight, 1% decrease in underweight, 5% decrease in overweight and 2% decrease in obese category. The Mean±SD for Post BMI was seen to be lower than that of Pre BMI and it was observed that Post BMI had a significant association with the Pre BMI with a p-value of 0.018 (p-value<0.05). The Mean±SD for consumption of breakfast in post-test was also seen to be lower than that of Breakfast Consumption in pre-test. The p-value calculated using paired t-test between the two parameters showed a highly significant correlation at $p \leqslant 0.001$ (0.000). Similar result was seen in paired t-test between carrying tiffin for pre and post-test, which also showed high significant correlation $p \leqslant 0.001$ (0.000). Other factors showing highly significant positive correlation according to t-test at $p \leqslant 0.001$ include Consuming junk/outside food (0.001), eating at a restaurant/ cafe (0.001), fruit consumption (0.000), tea/ coffee consumption (0.000), sweet consumption (0.000), time spent playing digital games every day (0.001), physical activity (0.000) and day dreaming (0.000). This indicated strong evidence against the null hypothesis, as there was less than a 0.1% probability the null is correct (and the results are random). Hence, the null hypothesis (H_0) was rejected. It implied that there was less than one in a thousand chance of statistical significance being wrong in the study. Factors showing significant correlation $p \leqslant 0.05$ were sleep timings (0.003), feeling on waking up (0.009) and making careless mistakes while studying (0.75). This indicated strong evidence against the null hypothesis, as there is less than a 5% probability the null was correct (and the results are random). Hence, the null hypothesis (H_0) was rejected.

Furthermore, crosstabulation of data obtained for samples playing digital games was carried out.

Table 3.2: Crosstabulation between playing digital games and BMI (Pre-Test)

Time spent playing digital games (Pre-Test) * BMI (Pre-Test) Crosstabulation

Duration (per day)	BMI				Total
	Underweight	Normal	Overweight	Obese	
Never	5	6	4	0	15
30 to 45 min	12	19	2	2	35
1 to 2 hrs	3	17	5	3	28
3 hrs or more	3	13	4	2	22

Table 3.3: Crosstabulation between playing digital games and BMI (Post-Test)

Time spent playing digital games (Post-Test) * BMI (Post-Test) Crosstabulation

Duration (per day)	BMI				Total
	Underweight	Normal	Overweight	Obese	
Never	4	14	2	1	21
30 to 45 min	10	34	6	2	52
1 to 2 hrs	4	11	2	0	17
3 hrs or more	4	4	0	2	10

As seen in table 3.2 And 3.3, the number of overweight individuals playing digital games for 3 hours or more everyday was decreased from 4 to 0, showing a 4% reduction. A significant 8% increase was seen in number of normal weighing subjects who never used electronic devices for playing digital games in the post-test. In both pre and post-test, maximum subjects spent 30-45 minutes playing digital games per day. This is the ideal time for media usage. This figure was increased from 35 to 52 subjects, showing a 17% increment.

The BMI observed in pre and post-test is graphically represented in Fig. 3.1 and 3.2 respectively.

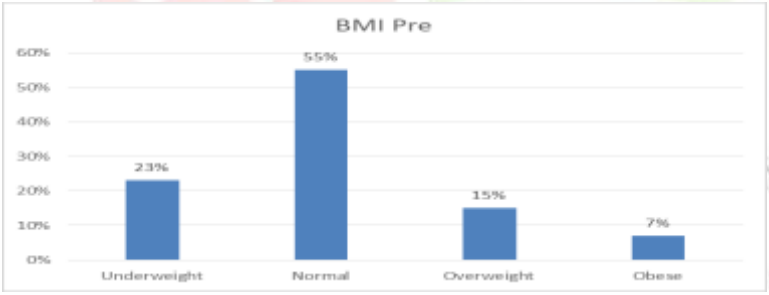

Fig. 3.1: BMI (Pre-test)

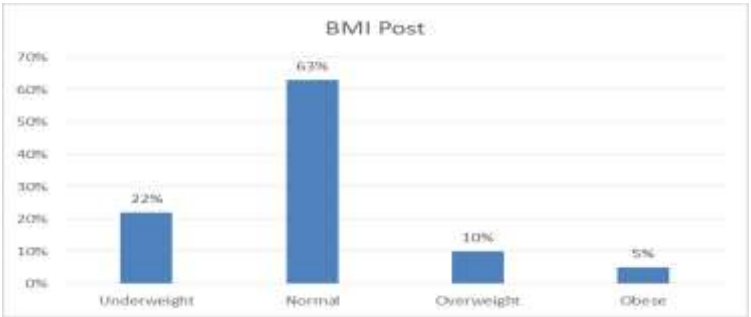

Fig. 3.2: BMI (Post-test)

IV. DISCUSSION

It is widely known that having a high BMI during adolescence is a strong indicator for development of obesity and cardiometabolic diseases during adulthood. Also, subjects who have unhealthy eating habits or low physical activity tend to have a higher BMI than their counterparts with healthier lifestyle habits.

Screen time, sleep pattern and dietary habits are all interrelated and together influence the subject's BMI. Subjects with poor sleep schedules usually have a higher screen time and eat excessive junk food when compared to those with lower screen time. Screen time is also inversely proportional to the subject's physical activity.

It can be seen that the programme had positive impact for almost all the parameters. Subjects implementing the advised healthy habits in their routine showed changes in their BMI. Overweight samples following the recommendations were seen to have normal BMI in post-test. Similarly, some underweight samples also had increased their BMI. Those neglecting the recommendations showed no positive changes in their BMI. It was advisable that parents continue monitoring all the parameters since they are interrelated and ensure that the subjects follow the recommendations even after the study was concluded. Subjects showing low compliance and remaining obese or overweight are at a high risk for developing metabolic disorders in the future and therefore should be given special attention to. They require further extended counseling. A similar programme should be conducted with the students from other ages who weren't included in the study. This is to warrant that awareness continues being spread to bring about necessary changes in the society.

V. CONCLUSION

The main focus of this study was to assess the screen time of adolescents in Mumbai city. Other than that, their sleep patterns and dietary habits were also assessed. This was done because it has been seen that these three factors are usually interrelated and changing one of them would not yield successful results unless the other two were also altered. All three factors have an influence on the Body Mass Index (BMI) of people. It was therefore seen that by reducing the screen time of samples and simultaneously improving their sleep pattern and dietary habits, radical changes in their BMI can be made. Screen time can be decreased by avoiding use of screen based media before bedtime, while eating, and consciously reducing the amount of time spent playing digital games. Digital games can also be substituted with more outdoor physical activities and sports. Parents also played a vital role in bringing about these changes in their children's lifestyle. Since they could reinforce rules and set boundaries or time limits. Additionally, positive impact was also seen on their quality of sleep. Samples with low screen time were seen to have more regular sleep timings and were able to sleep for the required time period. Similar effects were seen on their diet and physical activity.

VI. REFERENCES

1. Reedy, Jill, PhD,M.P.H., R.D., Krebs-Smith S. Dietary Sources of Energy, Solid Fats, and Added Sugars among Children and Adolescents in the United States. American Dietetic Association.Journal of the American Dietetic Association 2010 10;110(10):1477.
2. Perry G, Patil SP, Presley-Cantrell LR. Raising awareness of sleep as a healthy behavior. Prev Chronic Dis. 2013 Aug 8;10. doi: 10.5888/pcd10.130081
3. American Academy of Pediatrics. Council on Communications and Media. Children, adolescents, and the media. Pediatrics. 2013;132(5):958-61.
4. Goel N, Rao H, Durmer JS, Dinges DF. Neurocognitive consequences of sleep deprivation. Semin Neurol. 2009 Sep;29(4):320-39. doi: 10.1055/s-0029-1237117.
5. Weiss A, Xu F, Storfer-Isser A, Thomas A, Ievers-Landis CE, Redline S. The association of sleep duration with adolescents' fat and carbohydrate consumption. Sleep. 2010 Sep;33(9):1201-9.
6. Greydanus DE, Feucht C. Sleep disorders and sleep patterns in adolescents. Journal of Alternative Medicine Research 2012;4(2):129-147.
7. Yannakoulia M, Karayiannis D, Terzidou M, Kokkevi A, Sidossis LS. Nutrition-related habits of Greek adolescents. Eur J Clin Nutr 2004 04;58(4):580-6.
8. World Health Organization. Growth reference data for 5-19 years. Geneva: WHO; 2007.