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Association of skipping breakfast and different domains of cognitive function among undergraduate medical students: A cross-sectional study

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ABSTRACT

Objectives: To find out the prevalence of skipping breakfast and its association with different domains of cognitive function.

Materials and Methods: Using inclusion and exclusion criteria, a representative sample of 184 under graduate students were included. Cognitive function was assessed using previously validated scales of measurement like FDS (Forward Digit Span) and BDS (Backward Digit Span) for assessing short-term and working memory respectively and MMSE (Mini Mental Scale Examination) for assessing global cognitive function. Categorical variables were expressed as a percentage and continuous variables were expressed in terms of mean and median. Mann Whitney U test was used to compare the medians. A *P*-value of <0.05 was considered statistically significant.

Results: Almost three-quarter of the study participants were found to have skipped breakfast either once or more than once in a week. All the three scores (FDS, BDS and MMSE) were higher among those who took breakfast. However; only the differences in BDS and MMSE scores were statistically significant.

Conclusion: It was observed that those who took breakfast had higher BDS and MMSE scores indicating positive association between having breakfast and certain domains of cognitive function. Further, studies with robust study designs are needed to elicit the association of skipping breakfast and cognitive function, which would contribute further to our existing knowledge.

Keywords: Mini-Mental State Examination scores, Backward digit span, Forward digit span, Medical student

INTRODUCTION

Breakfast is considered to be an important meal of the day following overnight fasting because it provides energy to the brain, which is necessary for learning.[1,2] Glycogen stores are significantly depleted following long overnight fasting. Younger individuals have higher brain glucose metabolism and higher sleep demand. To maintain a higher metabolic rate, especially among young individuals, a continuous supply of energy is needed, which can only be fulfilled by a balanced and healthy breakfast.[3] Glucose being the main fuel for brain function, an optimal cognitive function requires maintenance of a stable blood glucose level. Among schoolchildren, a beneficial cognitive performance due to consumption of breakfast has been demonstrated.[4]

Apart from improved academic performance, breakfast provides more physical activity level, prevents overweight and obesity and thereby reduces the risk of diabetes, osteoporosis,

cardiovascular and other chronic diseases.[2,4] Evidence also demonstrates that people who eat breakfast every day have 35–50% lower risk of obesity and diabetes than their counterparts.[5]

Globally, the prevalence of skipping breakfast has been increasing, especially among students due to their busy schedule. Several studies from North America have reported a prevalence of skipping breakfast among adolescents ranging from 4 to 38%.[6] Much higher (30–75%) prevalence of skipping breakfast has been reported among medical students.[1,2,7-9] Studies conducted in India have also documented a fairly large proportion (23–74%) of medical students skipping breakfast.[10-16]

Medical students often miss breakfast due to several reasons including lack of time, as a means to reduce weight or sometimes not feeling hungry in the morning.[6,10,17] However, studies conducted among medical students in other study settings have not been able to generate enough evidence of an association between skipping breakfast and cognitive function which could be due to several procedural issues.[2] A systematic review to evaluate the effects of breakfast consumption on cognition among children and adolescents has highlighted the lack of enough research among adolescents with several methodological limitations.[4] Thus, it prompted us to generate more evidence and undertake a study among the medical undergraduates to estimate the prevalence of skipping breakfast and to find out the association between skipping breakfast and different domains of cognitive function.

MATERIALS AND METHODS

In a cross-sectional study, a detailed self-administered questionnaire was administered to all the medical undergraduate students of a deemed to be university in Odisha during July 2019–August 2019. This was followed by an interviewer-administered forward digit span (FDS) test, backward digit span (BDS) test and Mini-Mental State Examination (MMSE).

Students in the age group of 17–25 years and willing to participate were included in the study. Those taking alcohol/smoking or suffering from any cardiovascular/respiratory diseases or on any medication that is likely to affect the cognitive performance were excluded from the study.

Digit span tests (FDS and BDS) have traditionally been used for the measurement of cognitive function, namely short-term and working memory.[3] Participants were read aloud two lists of digits presented at a rate of one per second and asked to repeat them back in the same order that they were originally presented. Lists began with three digits until the length of nine digits was reached. If the subject repeated list 1 of a series correctly, it was scored plus and the next higher series was given. If the subject failed on list 1, he was given list 2 of the same series. The task was discontinued, when failure on both lists of a given series occurred. The score was the highest number of digits repeated without error on either list. The BDS task was administered similarly, with the exception that participants were asked to repeat the items in backward order from the original presentation. Lists began at two items in length and continued until 8 items, with two lists at each length.

The MMSE is one of the common tools used for the assessment of global cognitive status comprising of five areas of cognitive functioning (orientation, immediate memory, attention/concentration, delayed recall and language). MMSE has mostly been used for screening of cognitive impairment among adults and also for follow-up of patients with cognitive impairment.[18]

Considering the methodology and similarity of the study setting,[11] sample size was calculated using the formula (z^{2*} $p\hat{}$ $[1-p\hat{}]/\varepsilon^2$) where z is the z score (1.96), ε is the margin of error (7.41) and $p\hat{}$ is the population proportion (49.71). Thus, the sample size was worked out to be 175. With a non-response rate of about 5%, the sample was inflated to 184. The simple random sampling procedure was used to select the study participants from the college admission register.

Data were analysed using SPSS software (20.0v) licensed to the institute. Categorical variables were expressed as a percentage and continuous variables were expressed in terms of mean and median. Mann–Whitney U-test was used to compare the medians. $P < 0.05$ was considered statistically significant.

Ethical considerations

Participation in the survey was purely voluntary and informed written consent was obtained from every participant. Approval from the Institutional Ethical Committee was obtained before the study.

RESULTS

A total of 184 students participated in the survey. None refused, giving a response rate of 100%. The mean age of the students was 20.69 years with a standard deviation of 1.41 years and a standard error of 0.1 years. Female participants (57.1%) outnumbered the males.

Only about a quarter of the participants (24.5%) consumed breakfast every day. While 55.9% of the participants skipped breakfast at least 1–3 times a week, 19.6% of the participants skipped more than 3 times a week. About a third (32.6%) of the participants had not taken breakfast on the day of the survey. Further, it was observed that male participants skipped breakfast more frequently than females (Odds ratio: 2.56, confidence interval: 1.22–5.36).

The most common reasons for skipping breakfast, as mentioned in Table 1, were either no time (47.28%) or not liking the hostel food (12.5%). A fairly good number of students (8.15%) mentioned the stress of studying or examinations as the reason for skipping breakfast.

To establish the association of skipping breakfast with cognitive function, subjects having any chronic illness (7.6%), psychiatric illness (0.5%), on medications that can affect cognitive function (10.9%) and those who had the habit of smoking (3.3%) and/or were taking alcohol (1.1%) were excluded. The FDS, BDS and the MMSE scores of the remaining students (n = 164, 89.13%) were compared between the students who skipped breakfast on the day of the survey [Table 2] or those who usually skipped breakfast [Table 3] with their counterparts. It was observed that those who usually skipped breakfast or on the day of the survey had consistently lower FDS, BDS and MMSE scores as compared to their counterparts. However, the difference was statistically significant in BDS and MMSE scores among the usual breakfast skippers and non-skippers.

DISCUSSION

Positive attitude toward a healthy lifestyle and nutritional habits among medical students is vital, as they are the future health-care professionals, who, in turn, can influence the society at large. Breakfast consumption is one such marker of a healthy lifestyle. Research has shown that consumption of healthy breakfast is associated with important health outcomes including improved cognitive performance,[19] concentration and reduced fatigue,[1] which is crucial, especially for the health-care professionals.

We aimed to assess the prevalence of skipping breakfast among medical students and its association with different domains of cognitive function. It was disheartening to note that almost 75% of the participants skipped breakfast, either once or more than once a week.

This was similar to the findings of other cross-sectional studies conducted in Karnataka, India,[13] and Ghana.[1] However, studies conducted among the medical students in other parts of India, have reported a much lower prevalence of skipping

Table 1: Reasons for skipping breakfast among undergraduate medical students (n=184) (more than 1 response accepted).

Reason	Frequency	Percentage	Reason	Frequency	Percentage
Stress due to studies	5	2.72	No time	87	47.28
Not liking hostel food	23	12.50	Too lazy	7	3.80
To lose weight	8	4.35	Exam time	10	5.43
Wake up late	4	2.17			

Table 2: Comparison of FDS, BDS and the MMSE scores between the undergraduate medical students who skipped breakfast on the day of the survey with their counterparts (n=164).

Score	Have you taken BF today	*n*	Mean	Median	SD	SE of mean	*P*-value (Mann–Whitney U-test)
FDS	Yes	110	7.32	7	0.976	0.093	0.537 (NS)
	No	54	7.17	7	1.129	0.154	
BDS	Yes	110	4.13	4	1.093	0.104	0.103 (NS)
	No	54	3.89	4	1.144	0.156	
MMSE	Yes	110	24.74	25	2.391	0.228	0.658 (NS)
	No	54	24.41	25	2.924	0.398	

FDS: Forward digit span, BDS: Backward digit span, MMSE: Mini-Mental State Examination

Table 3: Comparison of FDS, BDS and the MMSE scores between the undergraduate medical students who usually skipped breakfast with their counterparts (n=164).

Score	Do you skip BF?	*n*	Mean	Median	SD	SE Mean	*P* value (Mann–Whitney U-test)
FDS	Never	39	7.46	7	0.913	0.146	0.255 (NS)
	Skipped	125	7.21	7	1.057	0.095	
BDS	Never	39	4.46	5	1.072	0.172	0.003 (S)
	Skipped	125	3.92	4	1.097	0.098	
MMSE	Never	39	25.36	25	2.096	0.336	0.051 (S)
	Skipped	125	24.40	24	2.673	0.239	

FDS: Forward digit span, BDS: Backward digit span, MMSE: Mini-Mental State Examination

breakfast.[10-12,14-16] In Puducherry, 59.8% of students skipped breakfast at least once a week, 40.8% at least twice a week and 24% skipped at least thrice a week. The prevalence of skipping breakfast was found to be higher among males than the female undergraduates.[10] Almost half of the surveyed medical students in Mangalore (49.7%)[11] and Manipal (47.3%)[12] skipped breakfast. In the Grant Medical College, Mumbai, it was 63%[14] and 32% in Karad,[15] Maharashtra. The lowest percentage of skipping breakfast was reported from Kerala (23%).[16]

A similar trend of skipping breakfast has been reported globally with only about a quarter of Croatian students reported to have consumed breakfast regularly.[7] An almost similar proportion of medical students has reported having skipped breakfast in Sri Lanka (55.4%)[2] and relatively lower reporting was from Malaysia (43.9%)[8] and China (28.9%).[9] Earlier, research has demonstrated that although medical students have a better understanding about healthy habits, they fail to apply it into practice.[8]

In our study, male students were found to skip breakfast more than the females, which is in confirmation of the gender differences observed in other studies.[9,10] Lack of time and not liking the hostel food were the most common reasons for skipping breakfast in our study setting. Research has also shown that skipping breakfast among medical undergraduates can be attributed to lack of time[8] or the stress of medical study.[20] On the contrary, researchers in other study settings have reported females skipping breakfast more than the males.[1,6] Females reportedly were more conscious of their body shape and inappropriately skipped breakfast to lose weight.

Cognitive functioning is of paramount importance in doctors as shown in an Australian study which demonstrated that 63% of all adverse medical events were due to cognitive impairment and most were preventable.[21] Although there is substantial evidence on the deleterious effects of skipping breakfast on the various domains of cognitive functioning,[6] our study on medical undergraduates showed statistically significant difference only in the BDS scores (which measures the working memory) with lower scores among those who usually skipped breakfast. However, the scores were higher among those who had breakfast regularly and also in those who had breakfast on the day of the survey. Similar findings have been reported by other authors, but among children.[6]

In two reviews, no conclusion was drawn on the benefits of breakfast on cognition in studies conducted in young adults.[4,22] The positive effect of breakfast has been attributed to be due to better nutrition instead of transient changes in blood glucose.[4] In another review on breakfast and learning, they concluded that although it is difficult to draw definitive conclusions about the short-term benefits of breakfast on learning, there is a strong connection between long-term benefits of eating breakfast on learning as well as positive health outcomes.[23]

Available literature did not show any evidence of MMSE being used in the assessment of cognitive function in adolescents and young adults or among medical students for assessing the effects of skipping breakfast. Our study revealed that MMSE and BDS scores were statistically significantly higher among those who usually did not skip breakfast. Although it cannot be ascertained that skipping breakfast has effects on global cognitive functioning due to the design of the study, there exists an association between the two.

CONCLUSION

This study, the first-ever conducted in the eastern part of India, has revealed that a substantial proportion of medical undergraduate students were found to be skipping breakfast. Contrary to the common belief that medical students who are the future health-care professionals are more disciplined about healthy lifestyle behaviour, the observations from the study prove otherwise. This uncovers the potential implications that the health system is likely to face, due to the long-term effects of skipping breakfast by medical students.

It was observed that the BDS and MMSE scores were higher among those who usually took breakfast. In the backdrop of the controversial findings from the reviewed literature regarding the effects of skipping breakfast on cognitive functions, though the differences of scores among the breakfast skippers and non-skippers were not statistically significant, it indicates that more research is needed with appropriate sample size and more robust study designs.

Evaluation of the reasons for skipping breakfast (no time, exam time, not liking the hostel food) reveals that simple measures such as behaviour change communication and monitoring the quality of food in the hostels in line with student's likes and dislikes would take a long way in improving the outcome of medical education.

Declaration of patient consent

Institutional Review Board permission obtained for the study.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Ackuaku-Dogbe E, Abaidoo, B. Breakfast eating habits among medical students. Ghana Med J 2014;48:66-70.
2. Liyanage G, Siriwardana HD, Wettasinghe CA, Kumarasiri MK,

Niwanthika TK. Breakfast habits and its relationship to body mass index, cognitive function among final year medical students. J Gen Pract 2017;5:8-11.
3. Adolphus K, Lawton CL, Champ CL, Dye L. The effects of breakfast and breakfast composition on cognition in children and adolescents: A systematic review. Adv Nutr 2016;7:590S-612S.
4. Hoyland A, Dye L, Lawton CL. A systematic review of the effect of breakfast on the cognitive performance of children and adolescents. Nutr Res Rev 2009;22:220.
5. Leidy HJ. The benefits of breakfast consumption to combat obesity and diabetes in young people. Am J Lifestyle Med 2013;7:99-103.
6. Mary ES. Adolescent breakfast skipping: An australian study. Adolescence 1998;33:851-61.
7. Nola IA, Jelinić JD, Matanić D, Pucarin-Cvetković J, Marković BB, Senta A, *et al*. Differences in eating and lifestyle habits between first-and sixth-year medical students from zagreb. Coll Antropol 2010;34:1289-94.
8. Ganasegeran K, Al-Dubai SA, Qureshi AM, Al-abed AA, Rizal AM, Aljunid SM. Social and psychological factors affecting eating habits among university students in a Malaysian medical school: A cross-sectional study. Nutr J 2012;11:1-7.
9. Sun J, Yi H, Liu Z, Wu Y, Bian J, Wu Y, *et al*. Factors associated with skipping breakfast among Inner Mongolia medical students in China. BMC Public Health 2013;13:1-8.
10. Mathiyalagen P, Yadav D, Anandaraj R, Vasudevan K, Sundar B, Priyadharsini R, *et al*. Breakfast consumption habit and its impact on nutrient intake and nutritional status of medical undergraduates. Prog Nutr 2019;21:570-6.
11. Badiger S, Kini S, Kumar N. Dietary patterns among students of health sciences and its association with morbidity in a private medical university of Coastal Karnataka: A cross-sectional study. Int J Community Med Public Health 2017;4:2870-4.
12. Saranya S, Rao CR, Kumar SC, Kamath V, Kamath A. Dietary habits and physical activity among medical students of a teaching hospital in South India: A descriptive analysis. Trop J Med Res 2016;19:172-7.
13. Anupama M, Iyengar K, Rajesh SS, Rajanna MS, Venkatesh P, Pillai G. A study on prevalence of obesity and life-style behaviour among medical students. Int J Community Med Public Health 2017;4:3314-8.
14. Deotale MK, Ranganathan U, Akarte SV. Prevalence of overweight and obesity among medical students and their knowledge, attitude and practices about obesity. Int J Sci Rep 2015;1:74-9.
15. Vibhute NA, Baad R, Belgaumi U, Kadashetti V, Bommanavar S, Kamate W. Dietary habits amongst medical students: An institution-based study. J Family Med Prim Care 2018;7:1464-6.
16. Amruth M, Kumar A. A cross-sectional study on BMI and eating habits among students in a medical college in Kerala. Int J Community Med Public Health 2019;6:1285-94.
17. Berkey C, Rockett H, Gillman M, Field A, Colditz G. Longitudinal study of skipping breakfast and weight change in adolescents. Int J Obes Relat Metab Disord 2003;27:1258-66.
18. Shigemori K, Ohgi S, Okuyama E, Shimura T, Schneider E. The factorial structure of the mini-mental state examination (MMSE) in Japanese dementia patients. BMC Geriatr 2010;10:36.
19. Tolfrey K, Zakrzewski JK. Breakfast, glycaemic index and health in young people. J Sport Health Sci 2012;1:149-59.
20. Iqbal S, Gupta S, Venkatarao E. Stress, anxiety and depression among medical undergraduate students and their socio-demographic correlates. Indian J Med Res 2015;141:354-7.
21. Wilson RM, Harrison BT, Gibberd RW, Hamilton JD. An analysis of the causes of adverse events from the quality in Australian health care study. Med J Aust 1999;170:411-5.
22. Pollitt E, Mathews R. Breakfast and cognition: An integrative summary. Am J Clin Nutr 1998;67:804S-13S.
23. Murphy J. Breakfast and learning: An updated review. Curr Nutr Food Sci 2007;3:3-36.

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