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Eat Fast, Die Young: The Pattern of Fast Food Consumption amongst International Medical Students

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Authors' contributions

This work was carried out in collaboration among all authors. Authors marked SK collected data from students over a period of 1 year. Author marked FABA formulated the research proposal and questionnaire. Author GAZ did the statistical analysis of the data. Author MNZBNH edited the research proposal and questionnaire. All authors read and approved the final manuscript.

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ABSTRACT

Objective: To investigate the factors influencing fast-food consumption amongst the International Medical Students of USM-KLE.
Hypothesis: Fast food consumption is deleterious to the overall health of a person, and thus we expect low fast food consumption amongst medical students of USM-KLE. Nevertheless, due to the lack of awareness and poor understanding of the ill effects of fast food consumption, the pattern of fast food consumption is increasing among the medical students of USM-KLE.
Materials and Methods: A cross-sectional survey-based study was conducted in the month of June 2018 by distributing questionnaires to 326 Malaysian students –from year 1 to year 5 – who are studying in Belgaum, India. The questions touched on the aspects of their profile, driving

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factors of fast food consumption, routine exercise pattern, and their knowledge on the deleterious effects of fast food on their health. Data was collected for their experience both in Malaysia & India, & these were then analysed using SPSS 16.0 software.

Results: In this study, the results were coded & translated according to each question. It is observed that there is a high prevalence of fast food consumption amongst the students; 97% of the students consume fast food.

Conclusion: The results of this study showed that despite their knowledge on the poor health effects of these foods. the students prefer to consume fast food mostly on the basis of their hectic schedule, the restaurants' close distance, the good taste of the meals, as well as their fast availability.

Keywords: Fast food; obesity; risk factors; physical activity.

1. INTRODUCTION

In 2016, more than 1.9 billion adults, 18 years and older, were overweight. Of these, over 650 million were obese [1]. Worldwide obesity has nearly tripled since 1975 [1] and the prevalence of obesity and overweight in populations continue to rise [2]. Obesity can be defined as a condition of abnormal or excess fat accumulation in adipose tissue, to the extent that health may be impaired [3] and abnormal development of resistance toward hormonal signal, mainly insulin and leptin which would normally control appetite, prevent overeating and increase energy utilization [4]. The WHO has classified overweight and obesity in adults based on various BMI (kg/m^2), and the associated comorbidities risk (Table 1) [5].

Table 1. Classification of overweight and obesity in adults according to BMI

Classification	BMI	Risk of co-morbidities
Underweight	<18.50	Low
Normal range	18.50-24.99	Average
Overweight	25.00-29.99	Increased
Obese class I	30.00-34.99	Moderate
Obese class II	35.00-39.99	Severe
Obese class III	≥40	Very severe

The prevalence of obesity amongst adults in India and Malaysia showed a continuing increase of the problem. According to National Family Health Survey India-3 (NFHS-3), 12.6% of women (15-49 Years) and 9.3% of men (15-49 Years) were overweight or obese in 2005-06. The problem of obesity is increasing, as 20.6% women and 18.9% men are found to be overweight or obese in NFHS-4(2015-16) [6]. As reported by the National Health and Morbidity Survey Malaysia (NHMS), prevalence of overweight among adult in Malaysia was 29.4% and the obesity prevalence was 15.1% in 2011. The burden was overwhelming in 2015, 30.0% was overweight while 17.7% were obese [7,8].

Frequent consumption of fast food is one of the main reasons for the rising BMI. It is a major risk factor for non-communicable diseases such cardiovascular disease (the leading cause of death in 2012) [1], type 2 diabetes, musculoskeletal disorders like osteoarthritis and carcinoma. Despite many of the diseases that are associated with fast food consumption, there are variable factors that made fast food so popular among young adult. In a busy and stressful modern life, many decisions are made based on time. The fact that fast food is quickly available, affordable and possessing palatable taste have made fast food irresistible. The availability of various types of food in a person's immediate vicinity or neighbourhood influences the food choices and eating habits as well [9]. Furthermore, fast food outlets are contemporary places for socialisation and celebration. Plus, the advertisements and menus all provide environmental clues that may trigger addictive overeating.

Fast foods are rich in highly processed meat and refined carbohydrates, sodium, total fat, saturated fatty acids, trans fats, cholesterol; and poor in essential nutrients and dietary fibre [10,11]. Multiple food additives are added into them to enhance the taste, texture, freshness and eye-appeal to attract the consumer. Many studies that test the safety of additives are based on animal trials. It is difficult to determine whether the results of an animal study equate to human health, though many of these studies show that the additives are potentially carcinogenic [12]. Also, a study shows consumption of processed food in diet has significant increase of more than 10% in risk of carcinoma, especially breast cancer [13].

Table 2. The common additives that found in fast food

Type of addictive and example	Purpose	Effect on health
-Flavors enhancer Eg: Monosodium Glutamate (MSG)	-Enhance the flavour	-Neurotoxin (excitotoxin) that shivels and kill the brain cell in hypothalamus -Chinese restaurant syndrome include headache, skin flushing, and sweating.
-Preservatives Eg: Tertiary butylhydroquinone (TBHQ)	-To preserve food by keeping fats and oils from going rancid.	-Hepatomegaly -Neurotoxic effect -Carcinogenic effect
-Anti-Oxidants Eg: Butylated Hydroxyanisole (BHA)	-To stop fat and oils from getting oxidized, changing colours and turn rancid.	-Carcinogenic effect, specifically papilloma and squamous cell carcinoma at the forestomach of rat, mice and golden Syrian hamster.
-Preservative, colouring and flavoring Eg: Nitrate	-Used with meat products, commonly added to bacon, ham, hot dogs, smoked fish. -Stabilizes the red colour of meat and add flavour. -Prevents the growth of bacteria	-Formation of carcinogenic compound, nitrosamines. Under certain high-temperature 99~185℃ [16] cooking conditions such as grilling, it transforms into a reactive compound that has been shown to promote cancer.
-Anticaking agent Eg: Calcium sulphate	-Used in baking as a dough conditioner, reducing stickiness, good source of dietary calcium.	-Bloating -Gas -Constipation -Loss of appetite -Hypertension
-Leavening agent Eg: Sodium Phosphate	-Used in dough to cause foaming action that lightens and softens the finished product. -Aid in control of pH	-Abdomen cramp -Nausea -Gas

Salt is a well-known food additive that is most commonly used in fast food industries because of its low cost and varied properties. It acts as a preservative, has antimicrobial effect & flavour-enhancing effects. The negative effects of excess dietary intake of sodium, has been linked to hypertension, stroke and consequently an increased risk of cardiovascular disease like coronary diseases as well as cardiac failure, and renal failure [14,15]. Monosodium Glutamate (MSG), Tertiary Butylhydroquinone (TBHQ), Butylated Hydroxyanisole (BHA), Nitrates, Calcium Sulfate, Sodium Phosphate [16] are the common additives that found in fast food (Table 2).

Malaysia and India are developing country and both have suffered from "Double burden of disease". At this moment, as we continue to deal with the problems of infectious diseases and undernutrition, we are simultaneously experiencing a rapid upsurge in non-communicable diseases risk factors such as obesity and overweight, particularly in urban settings. High rates of obesity will affect future populations' health, as well as their economy. [2]

University Sains Malaysia – Karnataka Lingayat Education International Medical Programme (USM-KLE IMP) is located in Belgaum, a city in the Indian state of Karnataka located in its northern part along the Western Ghats. Over the years, fast food outlets have mushroomed around the USM-KLE campus, including KFC, McDonald's, Subway, and Domino's Pizza. The distance to reach a fast food outlet mentioned above is approximately 200 meters, or about 3 minutes walking distance.

There are multiple pull factors and push factors that affect USM-KLE students' decision to consume fast food. This study aimed to understand the pattern of fast food consumption among medical students of USM-KLE. As we know, the non-communicable disease is largely preventable by efficiently tackling the obesogenic environment. Therefore, recognizing and understanding the pattern of fast food consumption among medical students of USM-KLE is crucial in order to design an effective and specific action plan needed to support healthy diets and regular physical activity.

2. MATERIALS AND METHODS

The data collection was completed over a year with students studying in USM-KLE, International Medical Programme based in Belgaum, Karnataka.

This cross-sectional study was conducted during the year of 2017 among Malaysian medical students in University Sains Malaysia-Karnataka Lingayat Education (USM-KLE), starting from second year until fifth year students. At present, from the information obtained from the university administration, about 400 students reside in the university hostel. A sample size of 326 students was obtained, which is 81.5% of the total strength. A pilot study was carried out with the first year students of USM-KLE. In the pilot study conducted on 40 students, informed consent was obtained, and self-administered questionnaires were distributed to the first year students in order to evaluate the feasibility of our questionnaires. The results were analysed and the questionnaire was modified.

After getting consent, random sampling was done, in which the self-administered questionnaires were distributed to the students according to the and around a total 74 students refused to participate. Questions on inquiry were based on demographics (gender, age, height and weight) shown in the Table 3. Questions which were based on their fast food consumption, behaviour, awareness and physical exercise are shown in Table 4. All the data were analysed using Statistical Package for Social Sciences (SPSS) program version 20. The students were asked to note down their recently recorded height and weight, and their weight before entering medical school. Body Mass Index (BMI) for each candidate was calculated by using SPSS.

Table 3. Personal details

• Sex
• Age
• Academic year
• Height
• Weight (before and after entering medical school

Table 4. Questions in relation to fast food consumption, awareness and physical activity

A6. Do you consume fast food?
❑ Yes *(proceed to question A7)*
❑ No *(proceed to question A13)*

A7. Since how many years have you been consuming fast food?

- ☐ < 5 years
- ☐ 5 – 10 years
- ☐ 10 – 15 years
- ☐ 15 – 20 years
- ☐ > 20 years

A8. State the outlets you usually visit:

Direction: Please tick (√) in the box below. You can tick more than one.

Outlets		Belgaum	Malaysia
		Yes	Yes
i.	KFC		
ii.	McDonald's		
iii.	Subway		
iv.	Domino's Pizza		

A9. Enumerate the frequency of you visiting the outlet in one week:

Outlets		Belgaum	Malaysia
		Number of visits	Number of visits
i.	KFC		
ii.	McDonald's		
iii.	Subway		
iv.	Domino's Pizza		

A10. What is the driving factor of you consuming fast food?

Direction: Please tick (√) in the box below. You can tick more than one.

Driving Factors		Belgaum	Malaysia
		Yes	Yes
i.	Close distance		
ii.	Fast availability		
iii.	Enjoy the taste		
iv.	Inability to cook		
v.	Affordable cost		
vi.	Hectic schedule (Limited Time)		
vii.	Variety of menu		
viii.	As a status icon (trending)		
ix.	Celebration purpose		
x.	Stress		
xi.	Advertisement (good promotion)		
xii.	Others (please state your reason)		

A11. During which mealtime time do you have fast food?

Direction: Please tick (√) in the box below. You can tick more than one.

Mealtime		Belgaum	Malaysia
		Yes	Yes
i.	Breakfast		
ii.	Lunch time		
iii.	Dinner time		
iv.	Snack time		
v.	Whenever I feel like it		

A12. State the types/names of the food and drinks you usually and preferably consume in a SINGLE visit to the outlet/s you have chosen in Question A7.

Outlets	Malaysia
i. KFC	
ii. McDonald's	
iii. Subway	
iv. Domino's Pizza	

Outlets	Belgaum
i. KFC	
ii. McDonald's	
iii. Subway	
iv. Domino's Pizza	

A13. State the reason why you do not visit fast food outlets?

Direction: Please answer this question if your answer is NO to question A6.

Please tick (√) in the box below

Reasons	Belgaum	Malaysia
	Yes	Yes
i. Because of the taste		
ii. The 'halal' status is doubted		
iii. Due to awareness of the ill effects on health		
iv. Because of your financial status		
v. Others (please state your reason)		

A14. Do you participate in regular exercise?

- ❑ Yes *(proceed to question A15)*
- ❑ No *(proceed to question A18)*

A15. What is the type of exercise you are usually involved in?

Direction: Please tick (√) in the box below. You can only tick ONCE.

Types of physical exercise	Yes
Moderate – intensity exercise (walking our pets, brisk walking, house chores)	
Vigorous – intensity exercise (running, cycling, aerobics, swimming, gym; Sports: volleyball, basketball, football, badminton, etc.)	

A16. How many days do you exercise per week?

- ❑ < 5 times
- ❑ ≥ 5 times

A17. How long do you spend for each session of exercise?

- ❑ < 30 minutes
- ❑ ≥ 30 minutes

A18. Are you aware of the effects of fast food consumption on your health?

- ❑ Yes
- ❑ No

A19. State the side effects you have experienced after eating fast food.

Time	Experiences
Short – term effect	
Long – term effect	

A20. Are you aware about the presence of these additives and preservatives in fast food?

Direction: Please tick (√) in the box below.

Chemicals, additives and preservative in fast food	Yes	No
Monosodium Glutamate (MSG)		
T*ertiary butylhydroquinone* (TBHQ)		
Calcium sulfate		
Sodium phosphate		
Nitrates		
Butylated Hydroxyanisole (BHA)		

A21. List the harmful effects of these additives and preservatives to the body. (If you know any)

Time	Harmful Effects
Short – term effect	
Long – term effect	

3. RESULTS AND DISCUSSION

About 67.17% of students who have participated in this study are females while 32.83% of students are males. The number of females more than double the number of males in this study.

Fast food is consumed by 97% of students in USM-KLE. Our study is aimed to find out the factors which contribute to this large number of consumers.

Highest number of students have been consuming fast food for 10-15 years. It is a habit indoctrinated to them from a young age. Fast food consumption is a normal lifestyle habit that these students have. Only 9.46% of students have been consuming fast food for less than 5 years. This time gap refers to the time when students finish high school and continue their study in universities and colleges. As they are far away from the comforts of home cooked food, they develop the habit of consuming fast food for various factors which will be discussed.

KFC boasts the highest number of consumers with 306 students saying that they consume KFC in Malaysia and in Belgaum. The numbers indicate that this is a habit which was not developed exclusively in Belgaum, but they have been exposed and normalized to fast food culture from Malaysia. Subway shows a high number of differences in consumers between Malaysia and Belgaum. This can be attributed primarily to the close distance of the outlet. The number of consumers of Domino's Pizza is the least among all the four outlets as there has been main concerns over the halal status in the outlet, thus affecting students' perception towards the outlet.

Close distance is the most prevalent factor towards the consumption of fast food. This factor is especially evident in Belgaum, where all the outlets taken into consideration in this study are 5 minutes walk away from the hostel. The food is easily available and acquirable; in fact all these fast food outlets are the closest and fastest way to get a meal out of all the restaurants in Belgaum. This reduces time taken to get a meal, and time is a particularly expensive commodity for medical students. This factor also correlates to the next highest factor which is fast availability. As the name itself suggests 'fast food' outlets

take a relatively short time in preparation and serving food as compared to many other services available to students. Another factor which takes into account of time constraint is hectic schedule. This is the fourth highest factor and its importance cannot be understated. A lot of students have classes from 9 AM to 5 PM. Moreover, a lot of them have on-call duties, study groups or other daily life responsibilities which prevents them from preparing their own food or getting food from other conventional restaurants. Not only is this time saving, but also energy saving as most students are sapped of their energy at the end of day. Taste is the 3rd highest driving factor in this equation. Disregarding the health effects of consumption of fast food, their taste is relatively assured and consistent. Students are bound to miss the comforts of food back in Malaysia and fast food outlets are the easiest way to connect their palate to home. It does not require them to explore on unfamiliar food which might not agree with them, fast food outlets provide a sure fire way of getting the same consistent taste from back home.

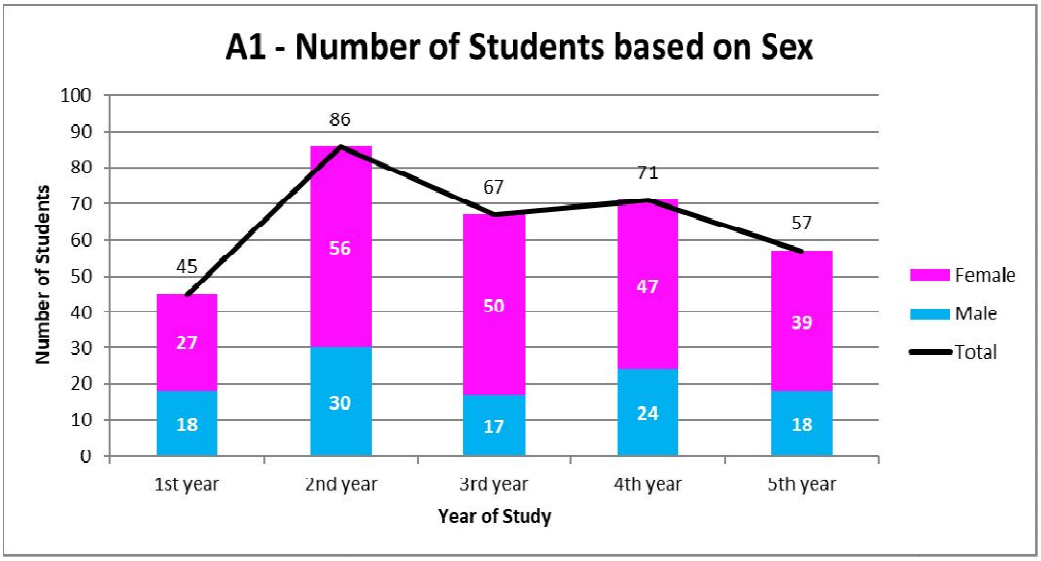

Fig. 1. Distribution of male and female in their respective academic years

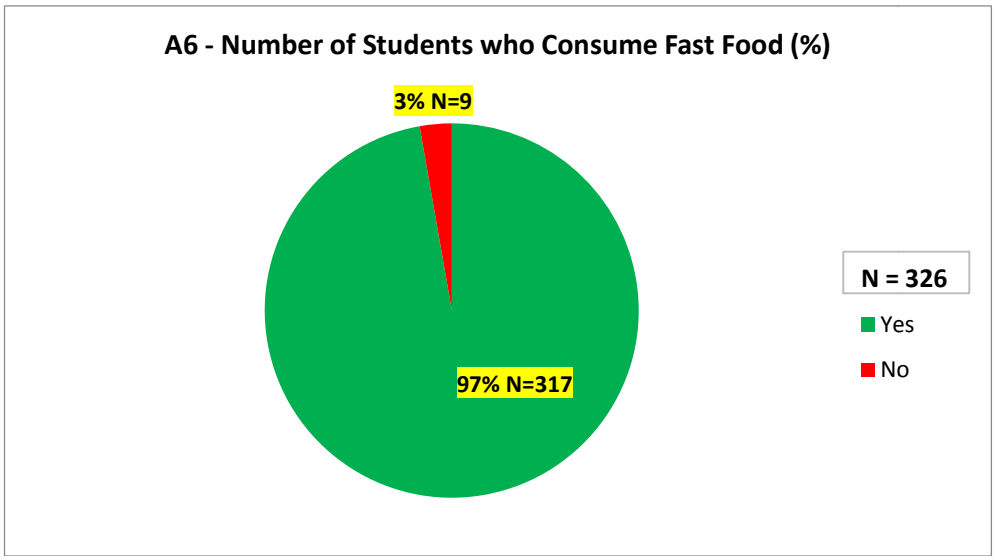

Fig. 2. Number of students consuming fast food

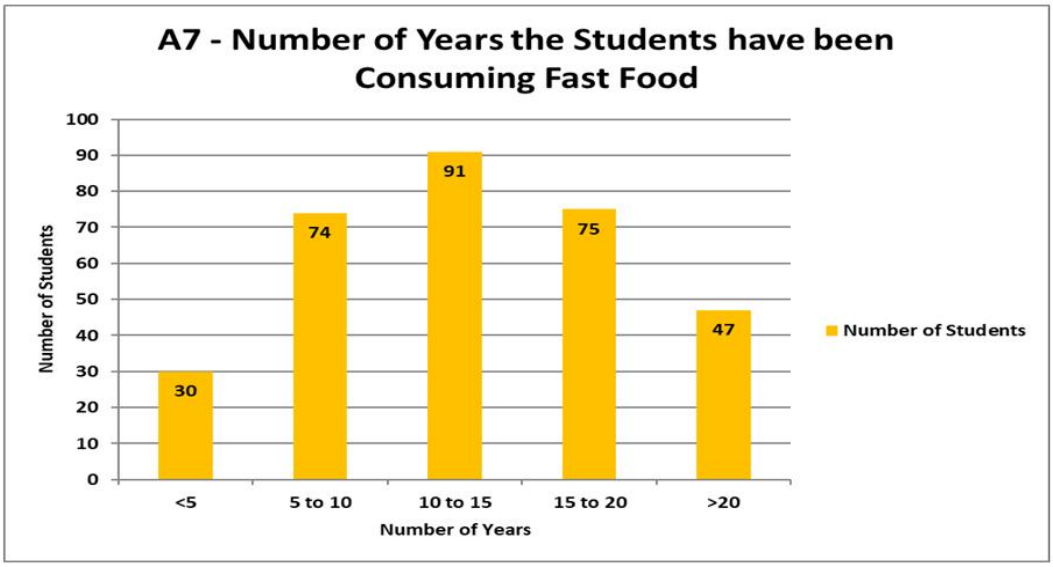

Fig. 3. Years of fast food consumption

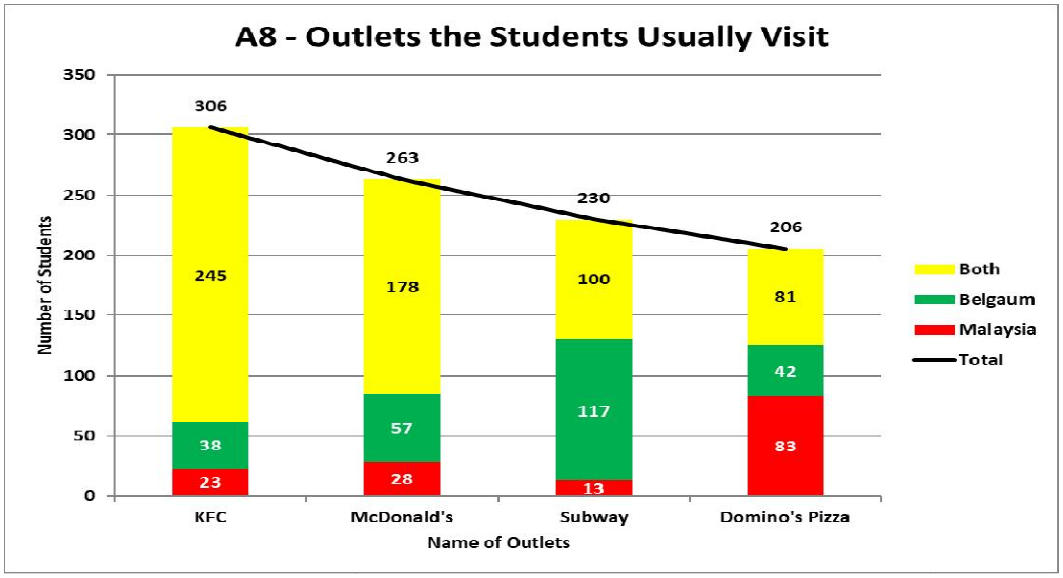

Fig. 4. Outlets frequently visited by students

The most preferred mealtime is clearly dinner in both Malaysia and Belgaum. This can mainly be attributed to the various factors that we have discussed above such as close distance, fast availability and hectic schedule. Again, time is the important playmaker here as students don't get much time to prepare their own food, or have the luxury of spending time in getting food from restaurants which are far away compared to these fast food outlets. This holds true for the second high preferred mealtime, lunch. Most of the students get 2 hours break for lunch time. Fast food becomes their choice of food for convenience sake.

It should also be noted here that the number of students consuming fast food at breakfast is minimal, that too majority coming from Malaysia. This is due to the availability of fast food around the clock in Malaysia while in Belgaum, these outlets only open at 11 am.

The approximate value of calories was measured by taking into account the usual meal students

consume in their preferred fast food outlet in one seating. Their preferred single meal is then converted into caloric values based on official calorie charts issued by the fast food outlets. The differences in calorie counts in Malaysia and Belgaum were also taken into consideration as official calorie charts were taken from each of the countries respectively.

KFC being the most visited outlet among students, also has the highest average calorie count among all the outlets. This high amount of calorie intake is dangerous from a health standpoint if students do not find a way to burn the calories away.

There is only a total of 9 out of 326 participants who claim to not consume fast food. This is a very small percentage (2.7%). Among the reasons evaluated, "Health Awareness" is the most prevalent reason. It is encouraging in terms of percentage among the students who do not consume fast food, but in overall terms it is a very small number. Another factor that we should

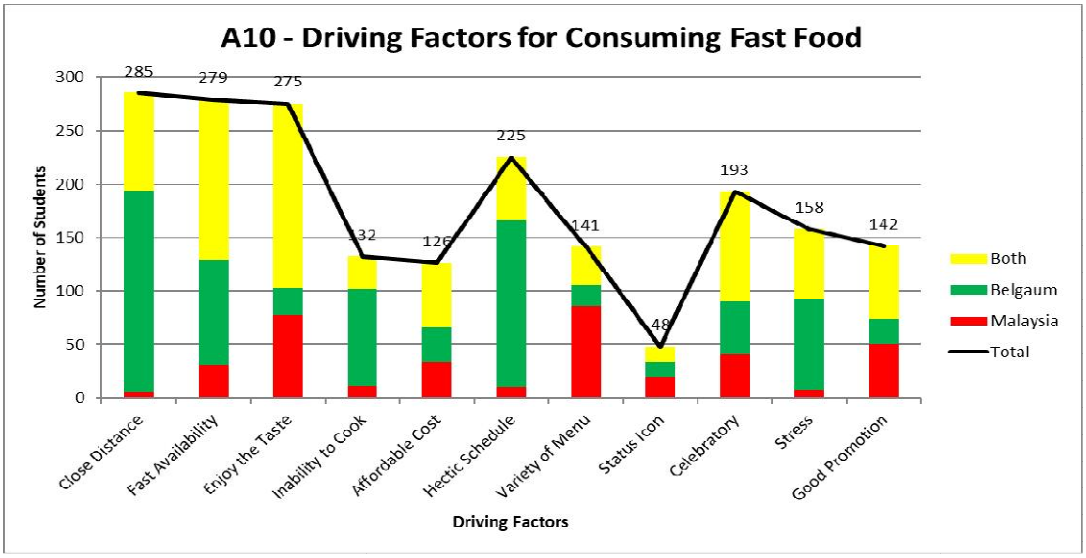

Fig. 5. Driving factors of fast food consumption

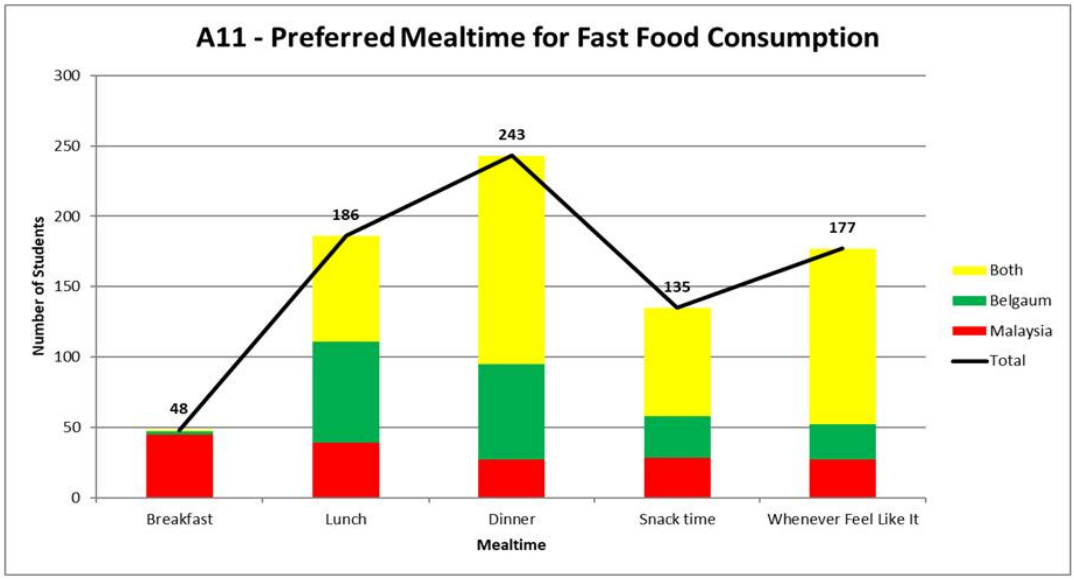

Fig. 6. Preferred mealtime for fast food consumption by students

give importance to is the doubt in the "Halal" status. Note that this factor does not come into consideration in Malaysia, where all the fast food outlets are certified to be "Halal".

78% out of 326 students claim to participate in regular exercise. This is an impressive number as the importance of regular exercise is well-documented. Not only it is important in burning the calories which are consumed, it allows an outlet for students to release their stress.

According to WHO, moderate exercise refers to "physical activity which requires a moderate amount of effort and noticeably accelerates the heart rate". Examples include brisk walking, dancing, housework and domestic chores. On the other hand, vigorous exercise means "physical activity which requires a large amount of effort and causes rapid breathing and a substantial increase in heart rate." Examples for this includes running, fast cycling, aerobic, fast swimming and etc.

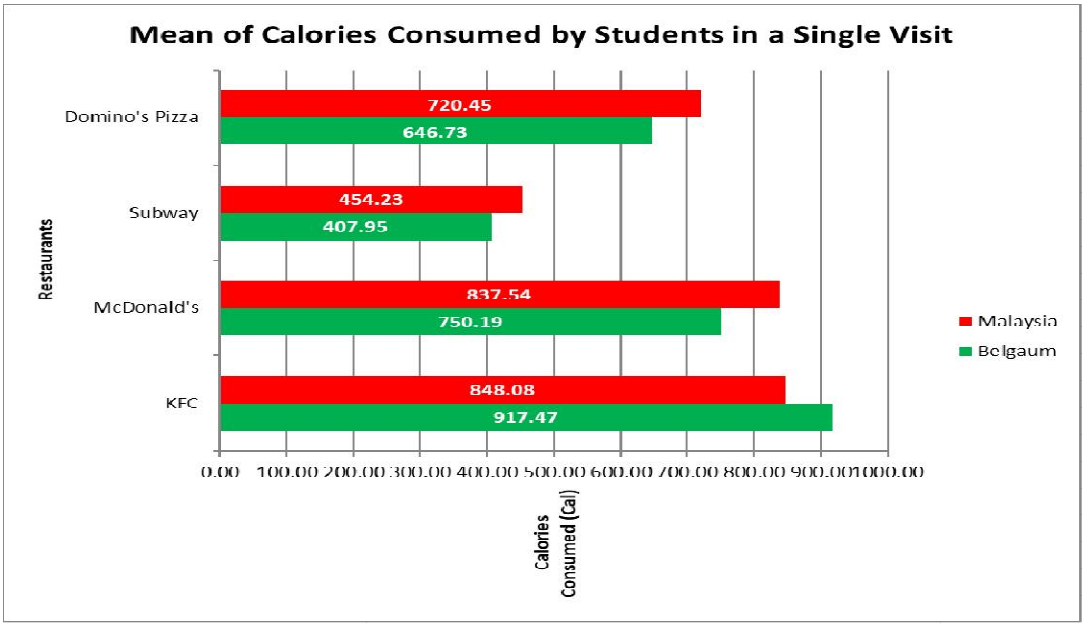

Fig. 7. Approximate value of calories consumed in a single visit by students

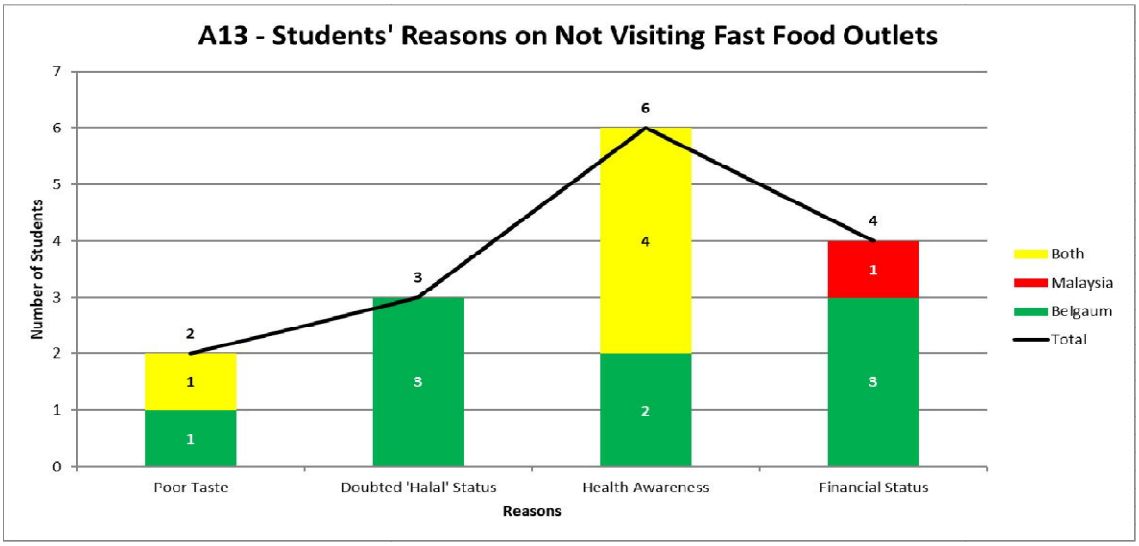

Fig. 8. Reasons for not visiting fast food outlets

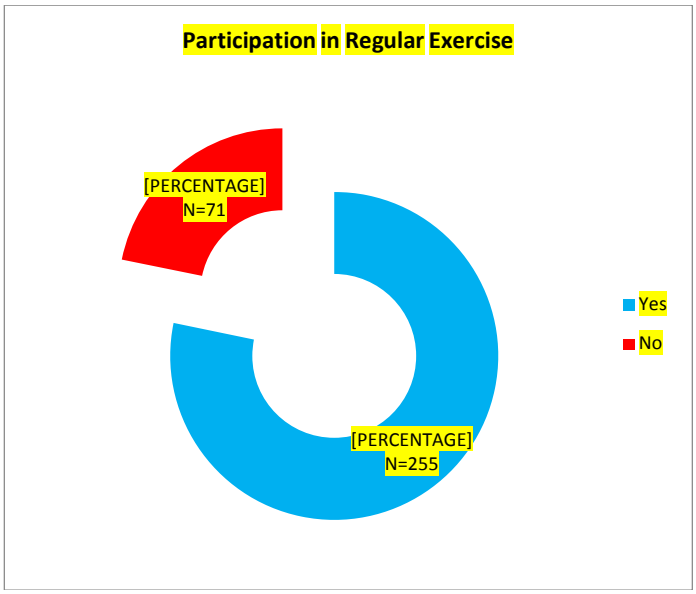

Fig. 9. Participation in regular exercise

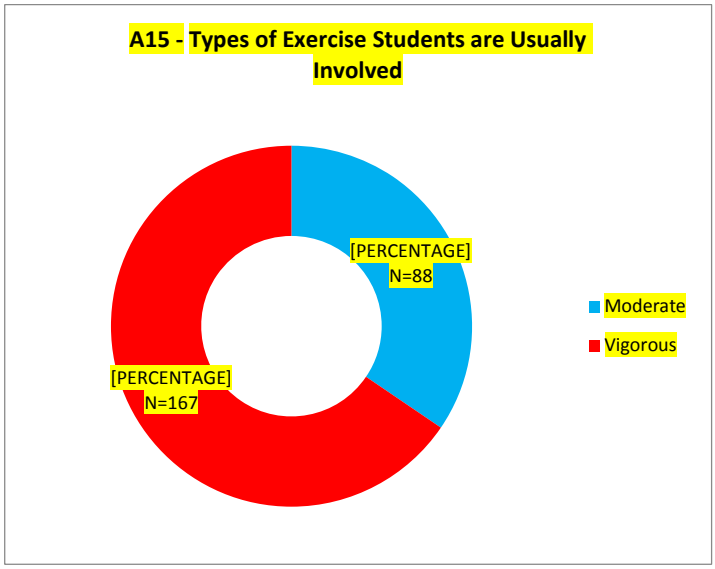

Fig. 10. Students by type of exercise usually involved

Type of exercise was considered as a factor in order to assess if there is any significant difference in BMI among students who participate in these two types of exercise.

62% of students claim to be able to exercise only less than 5 times in a week while 38% claim to be able to be able to exercise more than 5 times a week. This question was aimed to find the willingness of students to fit in exercise as part of their daily routine despite the hectic schedule that one goes through as a medical student.

Adults aged 18-64 are recommended to do at least 150 minutes of moderate-intensity physical activity throughout the week by WHO. The duration of exercise and days of exercise per week is taken into account in consideration of this factor to assess if students are getting at least the minimum amount of exercise and its impact on BMI of the students.

According to WHO, Health is defined as state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Health awareness in this situation refers to the knowledge in regards to the effects of fast food consumption on the physical well-being of a person.

Despite 98% of students claiming to be aware of the health impacts fast food have on their body, 97% of them still consume fast food. As medical students, it is impossible to be ignorant towards health awareness on this matter. The various driving factors pushing the consumption of fast food which has been discussed above trumps the health awareness that students possess.

Additives and preservatives are very common in the production of fast food products. There are various ill effects which excessive consumption of additives and preservatives bring and awareness towards the presence of them in fast food is the first step towards understanding their ill effects.

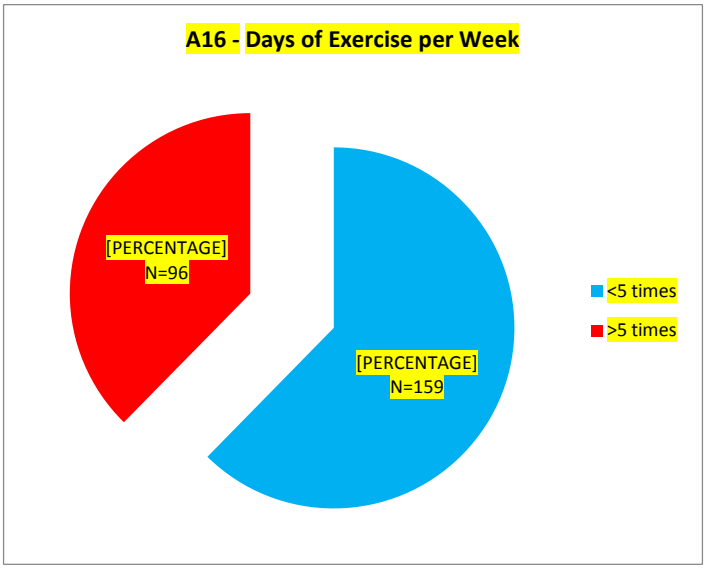

Fig. 11. Days of exercise per week

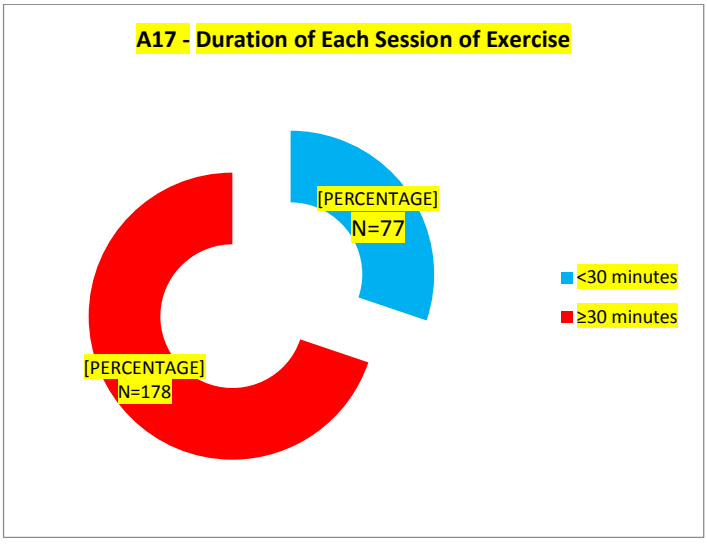

Fig. 12. Duration of each session of exercise

Unsurprisingly, over 95% of students are aware of the presence of Monosodium Glutamate. It is a well-documented and advertised additive. Despite the high awareness percentage, the fast food consumption percentage is still very high. This means that the awareness of its presence does not equate to the awareness of its ill health effects.

Students show relative unawareness towards the other additives and preservatives in comparison to MSG. In fact, excluding Sodium Phosphate and MSG, the awareness of the others is well below 50%.

BMI of the students were compared from the time they were in Malaysia and the current BMI. It was found that there was a noticeable drop in the BMI of the 1st year students since arriving in Belgaum. The current BMI was recorded 9 months since they arrived at Belgaum. This dip can be attributed to the inability of the students to adopt to the local cuisine.

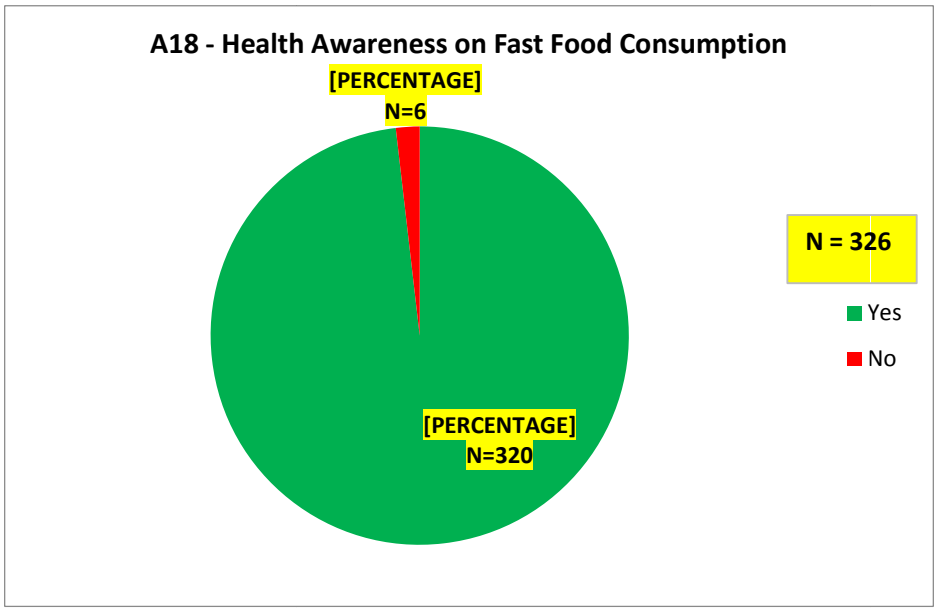

Fig. 13. Health awareness of fast food consumption among students

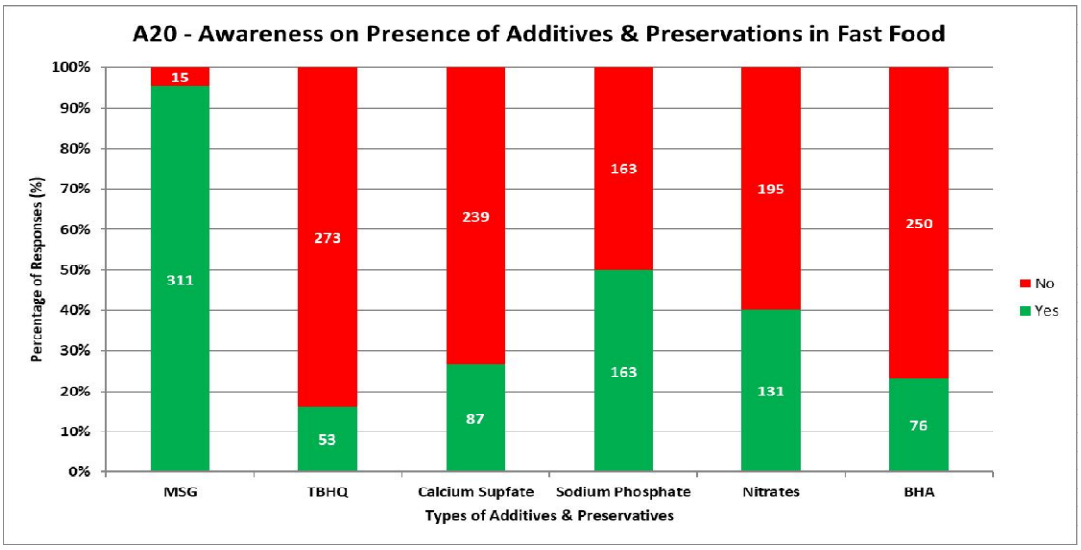

Fig. 14. Awareness of presence of additives and preservations in fast food

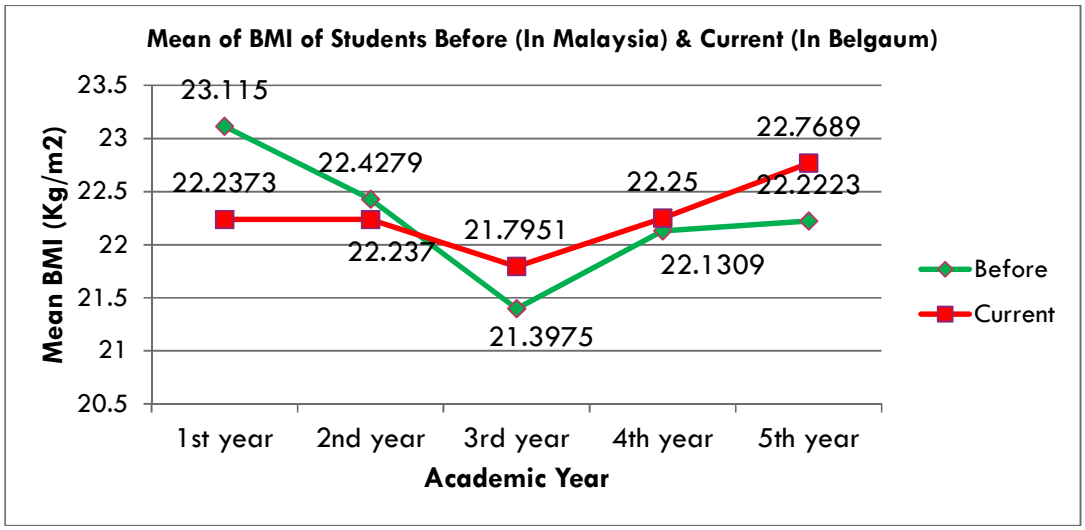

Fig. 15. Mean of BMI of students before (Malaysia) and after (Belgaum)

The 2nd year students BMI comparison shows the reduction in the gap between current and previous BMI. This indicates the assimilation of students to the food culture in a foreign country. From 3rd year onwards there is a marked increase in current BMI in comparison with initial BMI at Malaysia. Frequent consumption of fast food is the main factor which had lead to the increase in the BMI amongst these students.

4. CONCLUSION

Individual consumers need to be aware of the ill effects of fast food consumption as it is the leading cause of malnutrition over weight, obesity, metabolic syndrome, insulin resistance, Type 2 Diabetes Mellitus, hypertension, dyslipidemia, polycystic ovarian disease in young females, hormonal imbalance etc. Their dietary strategies for food choice according to their health needs to be devised. In this context, the supportive role of families, teachers and food vendors in making individuals, especially the younger generation, more educated with regards to health and nutrition can make a significant difference in the improvement of community health worldwide. Meals need to be planned according to their own nutritional demands. It is important that there are regular food restaurants besides the fast food restaurants near the colleges. The easy availability and taste of fast food outlets have allowed the students to be more viable for consuming fast food. It is also important that individuals have a right of preference. This preference is important, especially if there are food outlets which provides regular vegetable dishes, fruit juices, fruit salads and protein meals, and if the food outlets are at a close distance to the students.

CONSENT

Written informed consent from each student was obtained by providing the information and purpose of this study in English.

ETHICAL APPROVAL

The study protocol was approved by the Institutional Ethics Committee for projects on human subjects.

COMPETING INTERESTS

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly used products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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