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Influence of Food Purchase Behaviour on Diet Quality of University Athletes during COVID-19 Lockdown

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Abstract

Lockdown order during the COVID-19 pandemic creates new norms of lifestyle, including food accessibility. To understand whether this situation might affect food purchase behaviour (FPB) and diet quality in exceptional people such as athletes, online FPB and diet quality index-international (DQI-I) questionnaires were distributed to 299 university athletes but only 195 responded. The survey found FPB score of respondents was 63.3 ± 14.1 , whereas the DQI-I score was 61.8 ± 13.2 . A strong relationship between FPB and DQI-I scores, $r(193) = .64$, $p < .00001$, was determined. FPB and DQI-I were not affected by gender, age and college seniority differences.

Keywords: Food purchase behaviour, diet quality index, athletes, COVID-19

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1.0 Introduction

It is a common notion that the quality of diet depends on types of food intake and the ability to select quality food. As in modern lifestyle where access to food is commonly through purchasing, any limitation, i.e. during the lockdown, may influence food accessibility and thus diet quality. The impact of the movement control order following the COVID-19 pandemic caused disruption in many economic sectors, including food and beverage businesses, especially when conventional purchasing shifts to online shopping (Goddard, 2020). This new norm of food retailing can potentially alter food purchase behaviour and food values (Ellison et al., 2021). Accessibility to various foods is a major factor in providing a balanced and healthy diet for all individuals, let alone athletes. Athletes are a more exceptional group that requires a high-quality diet daily to maintain health and be physically fit. However, due to lockdown, the typical routine such as physical training might be restricted, which could be impactful not only on the physical but also the mental health of the athletes (Mehrsafar et al., 2020). Thus a survey was conducted to assess food accessibility by understanding the food purchase behaviour (FPB) and its relationship with diet quality among university athletes who are probably affected during the phenomenal pandemic.

2.0 Literature review

Diet quality can be referred to as food intake that meets individuals' requirements to sustain healthy (Elmadfa & Meyer, 2012). It is a concept of nutrition that covers nutritious food, food quality (taste, appearance), food safety dietary patterns of individuals to meet the

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needs or an indicator of variety across key food groups relative to dietary guidelines. The diet quality can be determined using the Diet Quality Index - International (DQI-I) questionnaire measuring the score of dietary components such as the intake of food groups, protein, fat, balanced diet (INDDEX, 2018). DQI-I questionnaire was developed by Kim et al. (2003).

Drastic changes in lifestyles and trends caused by the lockdown due to the COVID-19 have a lot of impact on purchasing pattern of many products, including foods and beverages (Hassen et al., 2020). When dining and shopping were restricted due to restaurants and shop closures, people look for an alternative way to purchase foods, and online buying became the popular option (Ellison et al., 2021). For some people, this situation affects accessibility to quality foods and leads to food insecurity and a poor quality diet (Singh et al., 2021).

For athletes whose performance relies on the quality of diet, the accessibility to quality foods is vital to provide optimal nutrition for performance. Even though the diet quality of athletes can be improved through professional dietary guidance and proper nutrition education, which could emphasize optimal sports nutrition (Capling et al., 2021), it is foods and their availability that play the real element. Making food decisions is important for athletes' health and performance. Planning proper nutrition strategy and timing and selecting appropriate foods are vital to optimize training adaptations and performance (Birkenhead & Slater, 2015).

3.0 Methodology

3.1 Subjects and study design

This study was correctional, where the relationship between two dependent variables of FPB and diet quality index (DQI) scores of subjects were determined. About 300 students, males and females aged between 18 and 30 years old, of Universiti Teknologi MARA were identified as university athletes in various sports, in which 195 of them responded to the online survey delivered to them using Google Form. The number of subjects could represent the whole population of the university student-athletes as it complies with Krejcie and Morgan's (1970) sample size formula. Each subject was given two weeks to complete the questionnaires. This survey was conducted during the COVID-19 lockdown period under the movement control order enforced by the government.

3.2 Instrument

The survey questionnaire was divided into three major sections. The first section recorded the demographic profiles such as gender, age, seniority and sport participation. The second section determined the FPB score, and the third one was used to score the DQI of the subjects.

FPB questionnaire was adopted from Sanlier and Karakus (2010), who modified the original version by Duyff (1998). Briefly, the questionnaire consists of 30 items that covers four major aspects, namely nutrition applications (5 questions), food safety applications (11 questions), cost-saving applications (9 questions), and convenience practices (5 questions). A four-level of Likert scale from 0, which indicates "never", 1 ("sometimes"), 2 ("often") and 3 ("always") was used to determine the score. The total score of FPB is ranged from 0 to 90.

DQI was determined using the Diet Quality Index - International (DQI-I) questionnaire that measures the score of diet quality based on five major components. The components are a variety of food groups intake (0-15 marks), variety of protein sources intake (0-5 marks), adequacy intake of 8 types of foods (vegetable, fruit, grain, fibre, protein, iron, calcium and vitamin C) (0-40 marks), moderate intake of 6 groups of fat (0-30 marks), and balanced macronutrient and fatty acid ratio (0-10 marks) (INDDEX, 2018). The total score of DQI-I is ranged from 0 to 100.

3.3 Data analysis

All data were analyzed descriptively and inferentially using IBM SPSS version 26. A normality test was performed to test the type of data distribution. All data variables were expressed as means (M) and the standard deviation (SD). Pearson's or Spearman's correlation test was used to determining relationships between variables depending on the type of data distribution. In all cases, the significance value was set at $p < 0.05$.

4.0 Results

4.1 Subjects' profiles

Table 1 shows the demographic profiles of the subjects. Out of 195 respondents in this study, females represent 55.4% of them, while males represent 44.6%. Statistically, males and females recorded a similar score of FPB and DQI-I. Age factor did not influence FPB and DQI when athletes aged 22 years old and above (70.8%) had similar scores to those aged below 22 years old. College seniority also did not influence FPB and DQI of the student-athletes when they had statistically similar scores.

Table 1: Characteristics of subjects

Variables	N	%	FPB score (mean±SD)	DQI-I score (mean±SD)
Gender				

Male	87	44.6	64.1±15.2	60.4±13.9
Female	108	55.4	62.8±13.2	63.1±12.6
Age				
Below 22 years	57	29.2	62.8±16.3	60.2±12.8
22 years and above	138	70.8	63.6±13.1	62.5±13.4
Seniority				
Junior	78	40.1	64.2±14.8	63.7±14.5
Senior	117	59.9	62.8±13.6	60.6±12.2
Overall	195	100	63.3±14.1	61.8±13.2

4.2 Score of FPB and DQI-I components

FPB and DQI-I scores of subjects were 63.3±14.1 and 61.8±13.2, respectively (Table 1). Table 2 shows the score of each component of FPB and DQI-I scores. Nutrition application of FPB scored 9.6±3.6 out of 15 marks, meaning 64% of the full score. The cost-saving application component scored 18.7±5.0, which means 69% of the full score. Meanwhile, the safety application and convenience practice components scored 24.9±5.4 and 10.2±2.7, which carry 75% and 68% of the full mark. The overall score of FPB was 70% of the total mark.

As for DQI-I components, the variety of food groups intake scored 10.9±2.4, which means 73% of the full mark. The variety of protein and eight food groups intake components recorded a score of 3.2±0.9 and 20.6±6.6 that, equivalent to 64% and 52% of the full mark, respectively. While moderation of fat and balanced intake scored 21.2±6.0 and 6.0±2.4, which carry 72% and 60% of the full mark, respectively. The overall score of DQI-I was 62% of the total mark.

Table 2: FPB and DQI-I components score

Questionnaire	Component	Score (mean±SD)	% of the full mark
FPB (N=195)	Nutrition application	9.6±3.6	64
	Cost-saving application	18.7±5.0	69
	Safety application	24.9±5.4	75
	Convenience practice	10.2±2.7	68
	Overall	63.3±14.1	70
DQI-I (N=195)	Variety of food groups' intake	10.9±2.4	73
	Variety of protein intake	3.2±0.9	64
	Intake of 8 food groups	20.6±6.6	52
	Moderation of fat intake	21.2±6.0	72
	Balanced intake	6.0±2.4	60
	Overall	61.8±13.2	62

4.3 Correlation between variables

There is no significant relationship between age and FPB and DQI. However, college seniority showed a very weak but significant negative correlation with DQI ($R=-0.158$, $p<0.05$) but not with FPB (Table 3). Cost-saving application, safety application and convenience practice had a strong positive correlation with FPB ($R=0.900$, 0.881 , 0.816 , $p<0.00001$, respectively) but showed weakly (safety application, $R=0.498$, $p<0.00001$) and moderate (cost-saving application, $R=0.516$, $p<0.00001$ and convenience practice, $R=0.564$, $p<0.00001$) correlation with DQI. Nutrition application was determined to have a moderate correlation with both FPB ($R=0.734$, $p<0.00001$) and DQI ($R=0.623$, $p<0.00001$).

Variety of food groups intake ($R=0.583$, $p<0.00001$), variety of protein intake ($R=0.510$, $p<0.00001$), intake of 8 food groups ($R=0.581$, $p<0.00001$) and balanced intake ($R=0.513$, $p<0.00001$) were moderately correlated with FPB. However, moderation of fat intake only recorded a weak correlation with FPB but significant ($R=0.258$, $p<0.05$). DQI showed a strong correlation with the intake of 8 food groups ($R=0.832$, $p<0.00001$), but only moderately correlated with a variety of food groups intake ($R=0.671$, $p<0.00001$), variety of protein intake

($R=0.722$, $p<0.00001$), moderation of fat intake ($R=0.615$, $p<0.00001$) and balanced intake ($R=0.745$, $p<0.00001$). Result also shows that FPB and DQI had a significant moderate correlation ($R=0.641$, $p<0.00001$).

Table 3: Level of correlation (R) between variables

Variables	FPB	DQI
Age	0.086	0.135
College seniority	-0.076	-0.158*
Nutrition application	0.734**	0.623**
Cost-saving application	0.900**	0.516**
Safety application	0.881**	0.498**
Convenience practice	0.816**	0.564**
Variety of food groups' intake	0.583**	0.671**
Variety of protein intake	0.510**	0.722**
Intake of 8 food groups	0.581**	0.832**
Moderation of fat intake	0.258*	0.615**
Balanced intake	0.513**	0.745**
FPB	-	0.641**

* $p<0.05$, ** $p<0.00001$

5.0 Discussion

During the COVID-19 lockdown period, when the movement of people to places was controlled and restricted, it may influence the daily routine of most people, including athletes. Outing activities such as dining, shopping and sport and recreational activities might be changed, altering individuals' lifestyles and trends. To understand whether this situation might influence food accessibility, a study was carried out to determine the food purchase behaviour, and relate it to the diet quality of a group of people that are probably affected, viz., athletes.

A group of 195 student-athletes who responded to the online survey was determined to score 63.3 ± 14.1 and 61.8 ± 13.2 for the food purchase behaviour (FPB) and diet quality index (DQI), respectively. When the FPB score is expressed in percentage of the total mark, the value becomes 70%, which is considered acceptable. There is a lack of evidence, i.e. norms or classification, to describe the score of FPB. But when compared to a study by Sanlier and Karakus (2010) that used a similar FPB questionnaire, our findings look comparable to the previous study. In fact, the score of FPB components, namely nutrition application, cost-saving application, safety and convenience practice, from the present study also show comparable to those of Sanlier and Karakus (2010).

Safety application is the major criterion when making a decision to purchase food when it scored 75%, which is the highest scoring compared to cost-saving applications, convenience practice and nutrition applications criteria. Food safety criteria such as expiry date, labelling, cleanness, quality of packaging and freshness were the main concern when purchasing food. This seems a common practice during the COVID-19 pandemic when people are wary about food handling and delivery and demand more safety and hygiene precautions (Olaimat et al., 2020).

Food prices can be insecure and become a major concern in certain communities, especially those with low income (Singh et al., 2021). This factor, however, is probably not the main concern for people in rich countries such as the United States when food insecurity unlikely occurs, in which price is not a top criterion in purchasing food taste was found more important than any other criteria (Ellison et al., 2021). In this study, food price was placed as the second important criterion. Cost-saving applications such as price tags were also important criteria. Food taste factor was not part of our used instruments anyway.

Even though convenience practice and nutrition applications were placed in the bottom two in terms of scoring percentage in this study, the scores are not much different from the top two criteria. People tend to shift towards more convenient food accessibility such as online purchasing and local product consumption and towards a healthier diet and home cooking (Hassen et al., 2020). In some communities, the concern of the pandemic plus local authority enforcement has changed eating behaviour.

DQI score from the present study is comparable to some previous studies (Kim et al., 2003). However, the DQI score of these student-athletes is much lower when compared with elite athletes, 62% versus 73% (Capling et al., 2021). Elite athletes typically have access to professional dietary guidance and nutrition education make them better scorers in diet quality than armature student-athletes. The variety of food groups intake and moderation of fat intake components were the top two scorers in scoring percentage. In contrast, the intake of 8 food groups component was the lowest.

A correlation test shows a positive relationship between food purchase behaviour and the diet quality of the student-athletes. This probably indicates that an athlete with better decision making in food purchasing will be having a better quality of diet. Since all components of FPB and DQI-I were correlated across each other, it means all components might be a complement each other. Nutrition applications in food purchasing had a moderate influence on the diet quality of the subjects. Reading nutrition facts on food labels and comparing nutrients and ingredients between similar food products align with a better quality diet. The relationship between food purchase behaviour components and diet quality also indicates a best practice of food purchasing leads to better quality foods thus better diet quality (Thiele et al., 2017).

A good perception of a quality diet may lead to a better food selection and purchasing even in a difficult situation, e.i. COVID-19 (Ellison et al., 2021). Our data shows the diet quality components such as a variety of food groups intake and balanced diet practice had a moderate relationship with food purchase behaviour. This could mean an athlete with good dietary practice can select and buy the right foods and choose safe and clean foods.

The difference in gender, age groups and college seniority did not affect food purchase behaviour and diet quality among the student-athletes. This means male and female athletes may have a similar trend in food purchasing, which is consistent with other reports (Crane et al., 2019). The age and seniority of student-athletes in this study were so marginal. Most of the subjects were considered young adults and probably by having similar lifestyles and trends. No difference in purchasing behaviour and diet quality was observed between them. Interestingly, college seniority was found to have a weak negative relationship with diet quality, something that needs to study further. In a previous report, people at a young age especially adolescents had the worst diet compared to adults and older groups (de Andrade et al., 2016).

6.0 Conclusion

The requirement of high-quality food is always critical for any athlete due to performance demand. However, due to the COVID-19 pandemic, which might restrict food accessibility, the diet quality of athletes might be at stake. This survey showed that during the movement control order due to the pandemic, the diet quality of student-athletes was subsequent with the food purchase behaviour and not affected by the order. Even though the food purchase behaviour showed a significant relationship with diet quality, other factors such as financial, training, fitness requirement, and professional support need to be considered and not underestimated.

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