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²The Effect of Nutrition Knowledge on Nutritional Status in Sport Science Students

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Abstract. The knowledge may vary to eating behavior which contributes to nutritional status and performance. Therefore, this study aims to know the relationship between nutrition knowledge and the nutritional status of students in the Sport Science Faculty of Universitas Negeri Medan. The study used a cross-sectional research design. Samples were 27 students in Sports Science. Nutritional knowledge was collected by using the Sport Nutrition Knowledge Questionnaire (SNKQ). Body mass index (BMI) was measured by anthropometry. Data analysis was descriptive and regression analysis. On average, nutrition knowledge score was in poor category whereas the knowledge of a balanced diet was in the good category. Meanwhile, the knowledge of carbohydrates, proteins, fats, vitamins and minerals was in poor category. Whereas water knowledge was in sufficient category. The result shows that 81.5% students have got normal BMI, while 14.5% and 3.7% are in overweight and underweight. The result of regression test shows $r = 0.580$ with $p\ 0.004 < 0.005$, which means that nutrition knowledge influences nutritional status.

1. Introduction

Energy is an important fuel to the body to carry out daily exercise and activities. It is obtained from food with nutrients. The food consumed every day must contain carbohydrates, proteins, fats, vitamins, minerals and water. Besides that, daily food consumption should be in accordance with the daily energy required. In order to have the students in Sport Science Faculty to meet their daily energy needs, they need to have nutrition knowledge. Good nutrition knowledge leads to healthy eating behavior, but it does not affect nutritional status [1].

Lack of knowledge, in contrast, will cause the inadequacy of nutritional intake. As a result, there will be an imbalance between macro and micronutrients intake, as well as liquid consumption. Low intake of iron will result in anemia [2]. Many young female athletes are found to have a lack of nutrition knowledge, low eating behavior, low confidence in their physical appearance and poor performance [3]. Nutrition knowledge is related to fat mass reduction and better performance of an athlete [4]. On average, athletes have got low knowledge of nutrition; the educational background and income level affect the level of knowledge [5]. Good nutrition knowledge especially in female athletes has a positive impact on the quality of food intake [6].

Other studies reported differences the level of knowledge based on race, where white athlete has got slightly higher knowledge than black athletes [7]. Whereas, teenage athletes have got higher knowledge than adult athletes [8]. An intervention of nutrition knowledge will improve nutrition

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knowledge compared to the control group [9]. This will improve nutritional status based on the reduction of body mass index [10]. Several studies recommended carbohydrate consumption at 30 – 60 gram/hour with 6 – 7% of sucrose, glucose and or maltodextrin. Carbohydrate consumption has a big impact in one’s performance as it reduces fatigue and hypoglycemia [11]. Teenagers who do a lot of sports have got a low understanding of nutrition [12].

The intervention of nutrition counseling is effective to promote changes in eating behaviour, nutrition knowledge and body composition (body mass index) of adolescent and adult athletes [8]. High-carbohydrate food administration and high glycemic index dinner, melatonin, tryptophan-rich protein, cherry juice and kiwi fruits have got high impact to athletes’ performance and recovery [13]. A right diet influenced performance, in which athletes must have balanced diet intake that involves carbohydrates, proteins, fats, vitamins and minerals [14]. Consumption of 15 – 30 gram of protein along with > 300 kcal of energy source leads to low body mass index and high muscle mass [15]. Based on a number of researches done, there are many factors affecting the nutrition knowledge in both athletes and non-athletes. The knowledge may vary to eating behavior which contributes to nutritional status and performance. Therefore, this study aims to know the relationship between nutrition knowledge and the nutritional status of students in Sports Science Faculty of Universitas Negeri Medan.

2. Method

The study used cross-sectional research design, conducted in Sport Science Faculty Universitas Negeri Medan. Samples were 27 students in Sport Science study who are registered in Coaching Method, Fitness and Aerobics Class. Nutrition knowledge was collected by using Sports Nutrition Knowledge Questionnaire (SNKP) which involves the knowledge assessment of carbohydrates, proteins, fats, vitamins, minerals and water. Body mass index (BMI) as nutritional status quantification was measured by anthropometry that uses body height (meter) and weight (kg). Nutrition knowledge was categorized into very good (85% - 100%), good (70% - 84%), sufficient (55% - 69%) and poor (<54%) [1]. BMI, based on WHO (1998), was categorized into underweight (<18.5 kg/m²), normal (18.5 – 24.9 kg/m²), overweight (25.0 – 29.9 kg/m²) and obese (>30 kg/m²). Data analysis was descriptive and regression analysis was done by using SPSS version 20.00.

3. Results and Discussion

3.1. Demographic Data

Table 1. Demographic data of sport science students

Variable	Category	Quantity	Percentage
Gender	Male	18	66.7
	Female	9	33.3
Age (Years)	19	3	11.1
	20	16	59.3
	21	8	29.6

66.7% samples are male, and the rest, 33.3%, are female. 59.3% of students are 20 years old, while 29.6% are 21 years old and 11.1% are 19 years old. During the research, all students were in fitness and aerobics sports. As active students in Sport Science, they need to understand the application of balanced nutrition for sport to meet the energy required in exercising as well as body tissue and health recovery. If the students are able to maintain adequate nutrition intake, they are expected to have improved performance.

3.2. Nutrition Knowledge

Exercise can go well when the energy needs are fulfilled. Besides energy, the students need to maintain their body conditions and physical health. Therefore, they have to pay attention to the daily nutrition intake. The food consumed needs to contain carbohydrates, proteins, fats, vitamins, minerals and water. Adequate nutrition intake will have impact in total energy requirement, physical health maintenance and overall health improvement.

Table 2. Nutrition knowledge of sport science students

Variable	Mean \pm sd
Nutrition knowledge (overall)	36.37 \pm 7.50
Knowledge of balanced diet	72.22 \pm 28.87
Knowledge of carbohydrates	39.70 \pm 15.26
Knowledge of proteins	33.37 \pm 12.76
Knowledge of fats	40.74 \pm 23.73
Knowledge of vitamins	19.74 \pm 11.62
Knowledge of minerals	20.37 \pm 19.66
Knowledge of water	60.00 \pm 12.40

On average, nutrition knowledge score was at 36.37 in poor category whereas the knowledge of balanced diet was at 72.22 in good category. Meanwhile, the knowledge of carbohydrates, proteins, fats, vitamins and minerals was in poor category with score of 39.70, 33.37, 40.74, 19.74 and 20.37 respectively. Whereas water knowledge was in sufficient category at score of 60.00. Nutritional education will be able to help improving athletes' understanding of nutrition intake based on the needs; such as proteins, carbohydrates as well as fats intakes.

The training was carried out for 12 weeks, 45 minutes for each session [4]. The session can be done to individuals. The carbohydrate supply to athletes need to be carefully monitored pre and post training as it also helps in adaptation process besides its function as energy source [18]. For athletes with endurance exercise need to be trained on the importance of carbohydrate to maintain the reservations and regulations of glycogen. While athletes who focus on speed, need the knowledge on nutrition intake for muscle tissue building. Diet plan is compulsory for an athlete [16]. However, the intake of carbohydrates, proteins and fats in athletes has yet been following the recommendations. Hence the need of nutritional education to improve the knowledge of nutrition and adequate nutrition intake [17]. Individual approach is necessary for proteins intake for athletes and adults as each person has got different needs based on their exercise intensity, duration and volume as well as training objectives [19].

Sufficient protein intake is improving body adaptation to the training [20]. Fats intake cannot be less than 20% of total energy, however it has to be limited during carbohydrates loading. Hydration loading of 400 – 800 g/hour: consume complete set of meal. Consumption of green vegetables, green tea and 240 – 360 ml cherry juice twice a day for 4 – 5 days pre-match and 2 – 3 day post-match [21]. A proper diet is the main requirement to achieve optimum performance. The quantity of carbohydrates, proteins, fats, vitamins, minerals and water intake is important to be monitored during training period [14]. Vitamin D improves the functions of skeletal muscles, fasten recovery stage, improve energy and strength production as well as increasing testosterone production. All of this improve athletes' performance. In fact, most athletes suffer from Vitamin D deficiency. Vitamin D can be obtained from milk, fish, fortified cereal and other fortified food products [22].

Vitamin C reduces the impact of oxidative stress, muscle damages and fatigue. It also improves body immune. Daily consumption of 5 portions or more of vegetables and fruits is able to reduce oxidative stress and it provides other health benefits [23]. However, there is a different study which stated that the consumption of vitamin C and E as exogenic antioxidant source leads to negative impact to health. This may happen due to the differences in training methodology and adaptation to

training. The recommendation given is to not increase the intake on vitamin C and E in healthy sportsmen and individuals [25]. Dehydration in athletes may endangered health [29].

3.3. Body Mass Index (BMI)

Nutrition knowledge is able to show the adequate amount of nutrition needed by an individual. If the nutrition intake is in accordance with the needs of energy then body mass index is maintained under normal condition. However, if the intake is bigger than the daily energy requirement, BMI can be above normal range over a period of time. Finally, when the intake is lesser than the energy requirement, BMI will be under normal range after a period of time.

Table 3. Physical characteristics of sport science students

Anthropometry	Mean ± sd
Weight (kg)	59.30 ± 6.49
Height (m)	1.64 ± 0.05
BMI (kg/m ²)	21.96 ± 2.34

On average, the students weighed 59.30 kg and the height measured was at 1.64 meter. This gave BMI (kg/m²) at 21.96.

Table 4. BMI classifications of sport science students

BMI	Quantity	Percentage
Underweight	1	3.7
Normal	22	81.5
Overweight	4	14.5

The result shows that 81.5% students have got normal BMI, while 14.5% and 3.7% are in overweight and underweight respectively. All underweight identified samples were female and none was male. As for the normal range, 77.3% were male and 22.7% were female. On the other hand, overweight students were found to be female 75% and male 25%. Athletes are required to have regular anthropometry testing to monitor and review the body composition [16].

3.4. The Influence of Nutrition Knowledge on BMI

The result of regression test shows $r = 0.541$ with $p < 0.004 < 0.005$, which means that nutrition knowledge influences nutritional status. This study shows students with lower knowledge have got higher nutritional status. Around 3.7% students with low knowledge of nutrition is under underweight body mass index. The result, however, differs from other studies where good knowledge in athletes and non-athletes did not significantly influence body mass index [1]. Another research stated that Vitamins C and E consumption in female athletes was not significantly meaningful to muscle damages, performance and body composition [24]. Athletes' understanding of nutrition is able to affect the choice of food made and result in the reduction of fats percentage in the body [4,26].

Athletes' knowledge of nutrition is related with food consumption, eating habit and choice of meal. They are able to understand the required intake based on their energy needs, hence the choice made on food with the best nutrients. Nutritional educations to football athletes are able to improve their understanding of nutrition and improve their eating patterns [27]. The level of knowledge is also able to improve the knowledge, attitude and actions on carbohydrates and proteins intakes. Besides that, it can also improve the nutrition intake [28] which should be in accordance with the energy needs and trainings to be carried out [29]. The guidelines of nutrition given to athletes may increase their weight. Therefore, guidelines should be given carefully in order to maintain weight [30].

4. Conclusion

The result shows knowledge on balanced nutrition of sport science students is in a good category with average 72.22. Carbohydrates knowledge average was at 39.70 in poor category. Protein knowledge average was at 33.37 in poor category. Fat knowledge was at 40.74 in poor category. Vitamin knowledge was at 19.74 in poor category. Mineral knowledge was at 20.37 in poor category. Knowledge on balanced water was at 60.00 in sufficient category. If accumulated as a whole, nutrition knowledge of sport science students average was at 36.37 in poor category. The result shows significant relationship between nutrition knowledge and nutritional status in Sport Science students with p value 0.004 ($p < 0.05$), where the lower the knowledge was, the more the nutritional status increases. Therefore, there is a need of nutritional education interventions to students and sport enthusiasts to improve the knowledge of nutrition. Improved nutritional intake is expected along with good knowledge.

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