Patterns of Running Physical Activity, Nutritional Status, and Dietary Composition in a Community of Recreational Marathon Athletes in Malang

Laras Putri Gamagitta[1], Muhammad Putra Ramadhan[2], Dena Indra Winahyu[1], Hafsari Nova Aryani[1], Agung Cendekia Putra Nusantara[3]

[1] Department of Midwifery, Faculty of Medicine, State University, Malang, Indonesia
[2] Departmenr of Nursing, Faculty of Medicine, State University, Malang, Indonesia
[3] Department of Medicine, Faculty of Medicine, University of Muhammadiyah Malang, Malang, Indonesia
*laras.putri.fik@um.ac.id***
muhammad.putra.fik@um.ac.id

Abstract. The recreational marathon running community in Malang has shown increasing participation, but the challenges related to their nutritional status and food composition are not well understood. This study aims to examine physical activity patterns, nutritional status, and food composition in this community. This quantitative descriptive study involved 60 respondents from the Run Malang Run community who filled out an online questionnaire regarding demographic data, physical activity patterns, nutritional status, and food composition. Data were analyzed using descriptive methods with SPSS version 26. The majority of respondents were male (61.7%) with an average age of 25.86 years. Most of them ran 3-4 times per week with an average distance of 26.16 km per week. The average BMI of respondents was 23.20 kg/m², with most in the normal category (51.7%). The composition of morning, afternoon, and evening meals showed that complex carbohydrates and animal protein were the main components, but vitamin and mineral intake was still less than optimal. Although athletes showed good physical activity patterns, there were gaps in micronutrient intake that could affect long-term performance and health. Interventions such as nutrition education and access to nutritious foods are needed to improve athlete health and performance outcomes. These findings highlight the importance of appropriate nutritional support in supporting the recreational marathon athlete community.

Keywords: nutritional status, dietary composition, recreational marathon runners, physical activity patterns, athlete nutrition

A. B. Wijaya and N. K. Dewi (eds.), *Proceedings of the Malang International Conference in Medical and Health Sciences (MICROMEDHS 2024)*, Advances in Health Sciences Research 87,
https://doi.org/10.2991/978-94-6463-807-3_20

1. Introduction

It has transformed from a purely competitive sport to one of the most popular recreational physical activities across varied age groups and abilities [1]. The increased participation in marathon running globally goes hand in glove with the greater movement toward human pursuits for physical activity and general health through endurance events [2]. In Indonesia, especially in the city of Malang, the membership of marathon athletes increased considerably. Besides health reasons, such as fresh air and physical fitness, the athletes are willing to engage in running due to other benefits derived from social and psychological aspects: the sense of belonging to a group increases because of group activities that build shared purposes.

Physical activity, especially at the level of intensity and duration, required in marathon running places huge demands on the body [3]. Such regular activities are known to have numerous health benefits, including cardiovascular fitness, metabolic function, and prevention of chronic diseases [4]. However, the rigorous nature of marathon training also places a great emphasis on proper nutritional support being very crucial [5]. There is somewhat of a symbiotic relationship that occurs between one's physical activity and nutritional status. Whereby physical activity may at times affect nutritional needs, the quality and composition of an individual's diet has a major effect on an athlete's performance and recovery [6]. Despite nutrition being one of the most important and underestimated aspects of health, many recreational athletes lack knowledge or resources to address their dietary needs sufficiently and thus are at a heightened risk of suboptimal performance and injuries. Nutritional status is defined as a multidimensional concept that includes nutrition in macronutrient and micronutrient intake, body composition, and overall energy balance [7].

Good nutritional status is considered important for marathon runners, as this will be able to directly impact endurance, stamina, and capability to recover after highly serious physical activity [8]. The dietary composition, or type and quantity of nutrients in their diets, helps decide energy availability and nutritional adequacy among athletes [9]. Carbohydrates, proteins, fats, vitamins, and minerals should be ingested in the right proportions to support the metabolic demands due to running long distances. In regard to Malang's recreational marathon athlete community, understanding how physical activity patterns, nutritional status, and dietary composition interrelate becomes important. Such a community, as motivated and active as it is, may face unique challenges regarding dietary habits, access to nutrition information, and appropriate food choices.

These may, in turn, be influenced by cultural food preferences, socioeconomic factors, and differences in nutrition knowledge. The purpose of this study, therefore, was to identify and describe running physical activities, assess nutritional status, and determine the nutrient content of foods consumed among members of the recreational marathon athlete community in Malang. Extensive research on such variables will shed light on the key variables to use in devising nutrition strategies and interventions that could enhance athletic performance and overall health outcomes in recreational marathon runners. Such an intervention might promote sustainability and growth in this dynamic athletic population.

Its findings also have a wider implication, as it provides a framework that can be utilized in the similar community of recreational athletes in other regions and, therefore, supporting the global movement towards healthier, more active life.

2. Method

A quantitative descriptive study using the survey method was performed. This kind of research approach was appropriate to describe several characteristics or conditions in a population [3], [12]. The population of this study consisted of all members of the Run Malang Run community. The sample in this study was taken by non-probability sampling technique. The sample in this study consisted of 60 respondents who are members of the Run Malang Run community and who are willing to join the study. The research instrument in this study is the questionnaire. The questionnaire is prepared by the researcher to collect demographic data, pattern of running physical activity, nutritional status, and food composition. Data in this study were collected by distributing questionnaires online to respondents. A link is provided to the respondents to fill out the questionnaire. Data collected were analyzed using techniques of descriptive analysis. The data analysis was carried out using SPSS version 26

3. Result

The results of demographic analysis showed that the majority of respondents were male (61.7%), had an undergraduate education level (71.7%), and had a field of work in other fields (40.0%) (Table. 1). In this study, it was found that the average age of respondents was 25.86 years old with the youngest age being 20 years old and the oldest being 26 years old and on average had joined the community within a period of 2.75 years with the shortest joining time of 1 year and the longest of 5 years (Table 2).

Table 1. Demographics of Respondents by Gender, Education, and Field of Work

Characteristica	*n*	*%*
Gender		
Male	37	61.7
Female	23	38.3
Education		
Middle school	9	15.0
S1 (undergraduate program)	43	71.7
S2 (graduate program)	8	13.3
Fields of Work		
Education Field	16	26.7
Health Field	5	8.3
Social Field	15	25.0
Others Field	24	40.0

Table 2. Demographics of Respondents Based on Age, Height, Weight, and Length of Joining the Community

Characteristics	Mean	Min - Max	Std. Deviation
Age	25.86	20 - 36	4.648
Length of time in the community	2.75	1.0 - 5.0	1.514

Physical Activity Pattern of running

The pattern of running activity in this study was identified from the frequency of training and distance run during the last 1 week. The results of this study showed that most of the respondents had a frequency of running 4 x/week (43.3%) with an average frequency of running in a week of 3.25 times, where the lowest frequency of running in a week was 2 times and the highest was 4 times. Meanwhile, the running distance showed that the majority of respondents were 15 Km (23.3%) and 30 Km (23.3%). In addition, it is known that the average running distance in the past week was 26.16 Km with the closest distance of 15.0 Km and the farthest distance of 40.0 Km (Table 3).

Table 3. Distribution of Physical Activity Patterns

Characteristics	n	%
Exercise Frequency		
2 x/week	11	18.3
3 x/week	23	38.3
4 x/week	26	43.3
Mean		3.25
Min - Max		2 - 4
Std. Deviation		0.750
Running Distance	14	23.3
15 Km	6	10.0
20 Km	11	18.3
25 Km	14	23.3
30 Km	11	18.3
35 Km	4	6.7
40 Km		
Mean		26.16
Min - Max		15.0 - 40.0
Std. Deviation		8.044

Nutrition Status

Nutritional status in this study was identified from body weight, height and BMI. The results showed that the average height of respondents was 167.58 cm with the lowest height of 148.0 cm and the highest of 187.0 cm. Based on body weight, the average respondent weighs 63.82 Kg with the lowest body weight of 45.0 Kg and the highest of 90.0 Kg. Meanwhile, the average BMI of respondents was 23.20 Kg/m2 with the lowest BMI of 17.3 Kg/m2 and the highest of 54.38 Kg/m2 (Table 4). Furthermore, this study sought the distribution of BMI based on the WHO classification. The results showed that most of the respondents had a normal BMI category (51.7%) (Table 5).

Tabel 4. Distribution of Nutritional Status

Characteristics	Mean	Min - Max	Std. Deviation
Height	167.58	148.0 - 187.0	8.289
Weight	63.825	45.0 – 90.0	11.292
BMI	23.20	17.3 - 54.38	5.107

Tabel 5. BMI Distribution Based on WHO Classification

Characteristics	n	%
BMI Classification		
Underweight	4	6.7
Normal	31	51.7
Overweight	10	16.7
Obesitas 1	13	21.7
Obesitas 2	2	3.3

Food Composition

In this study, food composition was identified based on three times of day: breakfast, lunch and dinner. The diet was also identified based on food components including carbohydrates, protein, vitamins and minerals. Furthermore, each food component was identified in more detail such as complex or simple carbohydrates, plant or animal proteins, and vitamins and minerals sourced from vegetables and fruits.

Morning Meal Composition

The majority of respondents eat breakfast every day (96.7%). The composition of the majority of respondents' morning meal consisted of carbohydrates (85.0%), protein (60.0%), and contained vitamins and minerals (60.0%). In more detail, this study showed that the type of carbohydrate most consumed was complex carbohydrates (75.0%). The type of protein most consumed in the morning meal was animal protein (38.3%). Meanwhile, vitamins and minerals from vegetables (36.7%) were the most consumed vitamins and minerals in the morning meal (Table. 6).

Tabel 6. Distribution of Morning Meal Composition

Characteristics	n	%
Breakfast		
No	2	3.3
Yes	58	96.7
Carbohydrate		
No	9	15.0
Yes	51	85.0
Protein		
No	24	40.0
Yes	36	60.0
Protein Type		
No Protein	23	38.3
Animal Products	23	38.3
Plant-based	5	8.3
Animal and Plant-based	9	15.0
Vitamin and Mineral		
No	36	60.0
Yes	24	40.0
Vitamin and Mineral Type		
No Vitamins and Minerals	36	60.0
Vegetable	22	36.7
Fruit	2	3.3

Lunch Meal Composition

Most respondents ate lunch every day (86.7%), while the rest did not eat lunch (13.3%). Most of the composition of the respondents' lunch consisted of carbohydrates (60.0%), protein (75.0%), and did not contain vitamins and minerals (65.0%). When viewed by type, this study shows that the type of carbohydrate most consumed is complex carbohydrates (56.7%). The type of protein most consumed at lunch was animal protein (60.0%). Meanwhile, vitamins and minerals from vegetables (31.7%) were the most consumed vitamins and minerals in the morning meal (Table. 7).

Table 7. Lunch Composition Distribution

Characteristics	n	%
Lunch		
No	8	13.3
Yes	52	86.7
Carbohydrate		
No	24	40.0
Yes	36	60.0
Carbohydrate Type		
No carbohydrate	23	38.3
Complex	34	56.7
Simplex	3	5.0
Protein		
No	15	25.0
Yes	45	75.0
Protein Type		
No protein	15	25.0
Animal products	36	60.0
Plant-based	1	1.7
Animal and Plant-based	8	13.3
Vitamin and Mineral		
No	39	65.0
Yes	21	35.0
Vitamin and Mineral Typr		
No Vitamin and Mineral	39	65.0
Vegetable	19	31.7
Fruit and vegetable	2	3.3

Evening Meal Composition

Most of the respondents ate meals every day (93.3%%). The composition of respondents at dinner mostly consisted of carbohydrates (83.3%), protein (88.3%), and did not contain vitamins and minerals (81.7%). When viewed by type, this study shows that the type of carbohydrate most consumed is complex carbohydrates (80.0%). The type of protein most consumed at lunch was animal protein (66.7%). Meanwhile, vitamins and minerals from vegetables (15.0%) were the most consumed vitamins and minerals in the morning meal (Table. 8).

Table 8. Lunch Composition Distribution

Characteristics	n	%
Breakfsst		

Characteristics	n	%
No	4	6.7
Yes	56	93.3
Carbohydrate		
No	10	16.7
Yes	50	83.3
Carbohydrate Type		
No Carbohydrate	10	16.7
Complex	48	80.0
Simplex	2	3.3
Protein		
No	7	11.7
Yes	53	88.3
Protein Type		
No Protein	7	11.7
Animal Products	40	66.7
Plant-based	1	1.7
Animal and Plant-based	12	20.0
Vitamin and Mineral		
No	49	81.7
Yes	11	18.3
Vitamin and Mineral Types		
No Vitamin and Mineral	49	81.7
Vegetable	9	15.0
Fruit	1	1.7
Vegetable and Fruit	1	1.7

4. Discussion

A study conducted on the nutritional status of recreational marathon runners in Malang presented information on how the pattern of physical activity, nutrient intake, and dietary composition interact within the community. The emphasis in this study was that gaps still exist, especially in nutritional practices, that would be highly needed for the optimization of performance and health, although most of the athletes performed running routines more frequently and had a healthy BMI.

In fact, endurance activities have been identified as strenuous and needing substantial nutritional support to maintain energy levels and expedite recovery [9]. Highlighted that a well-balanced diet, with an emphasis on the appropriate balance of macronutrients, forms an essential foundation for high metabolic demands during endurance sports. This corresponds to our findings, because most of the athletes consumed adequate carbohydrates and protein, while the intake of vitamins and minerals was often low. Low intake of essential micronutrients, as in this study, may hinder the recovery process and overall performance, which is also reflected in the concern of [2] about the overall nutritional intake of athletes. According to [7], social and cultural factors such as food preferences and economic status may further be adding to this nutritional gap in food choices of this community. This community requires specific nutrition interventions, not only to meet the demands of marathon running but also considering particular community needs and limitations.

Physical activity interacts with nutritional status and dietary composition in Malang recreational marathon runners to underline the challenge of pursuing optimal health and performance by endurance athletes. Even though most of the athletes were regularly practicing running, their dietary intake was varied, which hinted that nutritional knowledge does not always lead to good practice. For example, even when high carbohydrate intake is considered necessary in endurance sports in restoring energy, the research still found that athletes in significant proportions were deficient in a proper intake of vitamins and minerals relevant to the reduction of oxidative stress and supporting recovery Amawi et al. 2024. These results are also in agreement with [8], who established that endurance events such as marathon running stimulate synthesis and inhibit catabolism of the joint cartilage, along with increased energy requirements and inflammatory responses. These physiological changes give reason for emphasizing not only meeting the caloric needs but also adequate micronutrient intake, supporting anti-inflammatory processes for reducing the risk of injury and improving athletic endurance. The suboptimal intake of vitamins and minerals found in runners may represent a missed opportunity for enhancement of recovery and reduction of exercise-induced inflammation.

Socioeconomic factors, on one hand, have been identified by [7] to be influential in dietary habits. It would therefore follow that given the different levels of education and occupations among the poor runners, their access to information on nutrition and resources would be at variance and thus contribute to the inconsistencies in dietary habits. This would, therefore, probably be an indication that targeted interventions-for instance, community-based nutrition workshops or direct access to dietitian services-may help the athletes develop knowledge and practical strategies to optimize their nutrition.

Results of the present study are in line with global trends: According to [4], recreational endurance sports are becoming increasingly popular; however, nutrition practices hardly follow improvements in training. This underlines the real need for an integrative approach which embeds nutrition education as a core part of the overall training program for the recreational athlete. Thus, this research gap has implications for a more holistic model of athlete support in enhancing performance, long-term health, and well-being that can be used toward the sustainable development of a running community in Malang and beyond.

These insights show that efforts at closing this knowledge gap should be contemplated in a concerted manner between the sport organizations, nutrition experts, and local communities so that the required support is given to recreational athletes regarding their dietary practices to match the demands of the sport.

5. Conclusion

To sum it up, it's clear that nutritional interventions like nutrition education and access to nutritious foods are absolutely crucial. These findings underscore the immense importance of appropriate nutritional support for enhancing the health and performance of recreational marathon athletes.

6. Conflict of Interest

The author(s) declared no conflict of interest.

7. Acknowledgment

The authors are grateful to all participants in this study and Universitas Negeri Malang for the grant.

8. Reference

[1] Alves, A. J., Viana, J. L., Cavalcante, S. L., Oliveira, N. L., Duarte, J. A., Mota, J., Oliveira, J., & Ribeiro, F. (2016). Physical activity in primary and secondary prevention of cardiovascular disease: Overview updated. World journal of cardiology, 8(10), 575–583. https://doi.org/10.4330/wjc.v8.i10.575

[2] Amawi, A., AlKasasbeh, W., Jaradat, M., Almasri, A., Alobaidi, S., Hammad, A. A., Bishtawi, T., Fataftah, B., Turk, N., Saoud, H. A., Jarrar, A., & Ghazzawi, H. (2024). Athletes' nutritional demands: a narrative review of nutritional requirements. Frontiers in nutrition, 10, 1331854. https://doi.org/10.3389/fnut.2023.1331854

[3] Bouchard, C., Blair, S. N., & Haskell, W. L. (2012). Physical activity and health. Human Kinetics.

[4] Boullosa, D., Esteve-Lanao, J., Casado, A., Peyré-Tartaruga, L. A., Gomes da Rosa, R., & Del Coso, J. (2020). Factors Affecting Training and Physical Performance in Recreational Endurance Runners. Sports (Basel, Switzerland), 8(3), 35. https://doi.org/10.3390/sports8030035

[5] Burke L. M. (2007). Nutrition strategies for the marathon : fuel for training and racing. Sports medicine (Auckland, N.Z.), 37(4-5), 344–347. https://doi.org/10.2165/00007256-200737040-00018

[6] Caso, G., & Vecchio, R. (2022). Factors influencing independent older adults (un) healthy food choices: A systematic review and research agenda. Food Research International, 158, 111476.

[7] Hasanpouri, A., Rahmani, B., Gharakhanlou, B. J., Solaimanian, S., Shahsavari, S., Rasouli, A., Abbasi, S., Ebrahimi-Kalan, A., Rouzitalab, T., Hoseinabadi, Z., & Shiri-Shahsavar, M. R. (2023). Nutritional knowledge, attitude, and practice of professional athletes in an Iranian population (a cross-sectional study). BMC sports science, medicine & rehabilitation, 15(1), 164. https://doi.org/10.1186/s13102-023-00776-3

[8] Hernández-Hermoso, J. A., Nescolarde, L., Roca, E., Revuelta-López, E., Ara, J., & Bayes-Genis, A. (2021). Marathon Running Increases Synthesis and Decreases Catabolism of Joint Cartilage Type II Collagen Accompanied by High-Energy Demands and an Inflamatory Reaction. Frontiers in physiology, 12, 722718. https://doi.org/10.3389/fphys.2021.722718

[9] Moradell, A., Casajús, J. A., Moreno, L. A., Vicente-Rodríguez, G., & Gómez-Cabello, A. (2023). Effects of Diet-Exercise Interaction on Human Health across a Lifespan. Nutrients, 15(11), 2520. https://doi.org/10.3390/nu15112520

[10] Notoatmodjo. (2012). Metode Penelitian Kesehatan. Rineka Cipta

[11] Oukheda, M., Bouaouda, K., Mohtadi, K., Lebrazi, H., Derouiche, A., Kettani, A., Saile, R., & Taki, H. (2023). Association between nutritional status, body composition, and fitness level of adolescents in physical education in Casablanca,

Morocco. Frontiers in nutrition, 10, 1268369. https://doi.org/10.3389/fnut.2023.1268369

[12] Tanzeh, A., & Arikunto, S. (2014). Metode Penelitian Metode Penelitian. Metode Penelitian, 22–34.