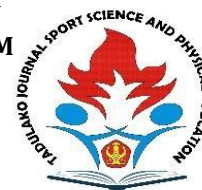




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EFFECT OF THE GLYCEMIC INDEX OF SELECTED TYPES OF DATES ON METABOLIC RESPONSE AND PHYSICAL PERFORMANCE IN TRAINED ATHLETES

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ABSTRAK

This study utilized a randomized control trial with thirty (30) athletes volleyball. They were equally grouped based on the type of dates ingested. They were subjected to a fixed amount of carbohydrate consumption (50-70g) before physical activity, as per existing guidelines for nutritional supplementation prior to exercise. Various measures were evaluated. Metabolic indicators included blood glucose concentration, insulin concentration, and lactate concentration. Physical fitness was also assessed via endurance tests. The results showed statistically significant differences ($p \leq 0.05$) Zahidi dates produced the most stable metabolic response, indicated by the lowest mean blood glucose (90 ± 5 mg/dL) and insulin levels (9.2 ± 1.1 μ U/mL) compared to Qaranfali and Medjool. Conversely, Qaranfali showed the highest physical performance results (1300 m) and the highest rate of improvement (16.0%), followed by Medjool (1280 m; 15.3%) and Zahidi (1250 m; 13.6%). These results suggest that dates with a low glycemic index support metabolic between Of the three groups, less fluctuation in insulin secretion compared to the other groups, which reinforces Energy expenditure efficiency during exercise. In contrast, the high-glycemic index (GI) date group showed a rapid rise in glucose levels, indicating their role in providing immediate, short-term energy. The study concludes that dates represent an effective and reliable natural food source for sports nutrition strategies, and that the glycemic index is a crucial factor in determining their physiological and performance effects, thus opening up new possibilities. This opens the door for further applied research in sporting settings, environments, particularly in date-producing countries.

Keyword: *Dates, Glycemic Index, Metabolic Response, Physical Performance, Athletes natural carbohydrates.*



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INTRODUCTION

Sports nutrition is one of the fundamental pillars in improving physical performance and athletic achievement, as carbohydrates play a pivotal role in supplying the body with the necessary energy during physical activity, in addition to their role in recovery. Muscle glycogen storage after exercise (Hawley et al., 2006; Rossi et al., 2017; Spriet & Gibala, 2004). The scientific literature shows that the type and timing of carbohydrate intake can directly influence physiological response and athletic performance, particularly regarding blood sugar regulation and insulin response. In this context, the concept of the glycemic index is used as a scientific tool to classify carbohydrate-rich foods based on their speed in raising blood glucose levels, with studies indicating that low-glycemic-index foods (Hameed, 2025; Morral-Yepes et al., 2023). Glycemics contribute to a gradual and sustained energy -index foods lead to a rapid rise in blood sugar followed by a relatively sharp drop (Gillbanks, 2020).

Dates are a natural food source rich in carbohydrates, containing varying proportions of glucose and fructose, along with smaller amounts of sucrose, giving them unique metabolic properties that make them suitable for use in sports nutrition (Blongkod, 2022; Hawley et al., 2006). The dates are also rich in essential minerals such as potassium, which are important in enhancing muscle performance and lowering exhaustion during workouts (Abarghoueinejad et al., 2021; Adewale et al., 2024; Rossi et al., 2017). Although these qualities are very nutritious, it is important to note that the different glycemic indexes of various dates affect their performance in boosting physical efficiency. Some studies that certain types. Carbohydrates consumed before exercise can affect endurance, energy, and fatigue levels (Charles et al., 2017; Bagus Wahyu Prastyo et al., 2017; Bassett, 2000).

However, studies examining the effects of different types of dates are still lacking. The variations within this framework are limited, especially in Arab environments where dates are an essential part of their diet. Based on the above, the importance of studying the effect of the glycemic index of different types of dates on the metabolic response and physical performance of athletes becomes clear, with the aim of reaching accurate scientific recommendations that can be applied in the field of training and sports nutrition.

Importance of the Research:

The importance of this study stems from the fact that it sheds light on one of the important aspects of sports nutrition, which is Using natural carbohydrate sources is an effective alternative to artificial dietary supplements. Studies indicate that relying on natural foods may provide additional benefits related to metabolic response and overall health (Abduh et al., 2024; Bhattad & Pacifico, 2022). The importance of this research also lies in its link between the glycemic index and the physiological response of athletes, which helps in understanding how different types of dates affect blood sugar regulation and insulin secretion, and thus improve performance. Energy use efficiency during physical performance (Baiget et al., 2014; Baláš et al., 2012; Booth & Orr, 2016).

From a practical standpoint, the results of this study can contribute to: Developing sports nutrition strategies based on local resources (dates). Reducing reliance on expensive nutritional supplements. Improving physical performance and recovery in athletes. This study provides scientific guidance for coaches and nutritionists on selecting the appropriate type of dates based on the nature of the athletic activity (Bergeron et al., 2020; Lloyd et al., 2023). Furthermore, this study represents a significant scientific contribution to the field of sports nutrition, particularly in sports environments. Where date cultivation is widespread, Arab regions which enhances the applied and economic relevance of this research. By examining the nutritional and physiological value of locally available date varieties, this study also supports the broader concept of food sovereignty, as it highlights the potential of culturally rooted and regionally produced foods to contribute to health, exercise nutrition, and sustainable

dietary practices.

Research Problem:

Despite the widespread use of dates in the daily diet, including among athletes, There is a clear lack of scientific studies that have addressed the effect of the different glycemic index of date varieties on metabolic response and physical performance. The research problem lies in the lack of clarity regarding which types of dates are most suitable for use at different times of physical activity, whether before, during, or after exercise, given the variation in their glucose and fructose content. This affects blood sugar regulation and insulin levels.

Furthermore, most current sports nutrition recommendations are based on artificial carbohydrate sources or studies. It was conducted in non-Arab environments, which limits the possibility of direct application in societies that rely on dates as a primary food source. Therefore, this research seeks to answer the following main question: What is the effect of the glycemic index of different types of dates on metabolic response and physical performance in

Research Objectives:

This research aims to study the physiological and physical effects of varying glycemic indexes of selected date varieties on athletes, by achieving the following objectives: To examine the effects of the glycemic index of different date varieties, namely Zahidi, Qarnaflī, and Medjool, on the integrated metabolic response and physical performance of trained athletes. To analyze the interconnected biochemical responses, including blood glucose, insulin, and lactate levels, after consuming different date varieties before exercise, and to determine how these metabolic changes are associated with physical performance outcomes.

METHOD

The researcher adopted the experimental method using the Randomized Controlled Design (RCD) for equivalent groups. This design is suitable for studying the effect of nutritional interventions on physiological response and physical performance. It is one of the most accurate designs for controlling extraneous variables, thus enhancing the validity of the results (Tahsin Hussein Rassul, 2023). The sample members were randomly distributed into three experimental groups according to the type of dates consumed, based on the difference in the glycemic index, with the aim of studying its effect on metabolic response and physical performance. The research population and sample: The research population consisted of volleyball players in local sports clubs. A sample of (30) was selected. Players were randomly selected, aged 18–25, who were trained athletes. The researcher adopted the experimental method using the Randomized Controlled Design (RCD) for equivalent groups. This design is suitable for studying the effect of nutritional interventions on physiological response and physical performance. It is one of the most accurate designs for controlling extraneous variables, thus enhancing the validity of the results (Tahsin Hussein Rassul, 2023). Players with recent injuries, chronic disease, or metabolic disorders were excluded from the study.

The sample was divided into three equal groups (10 players per group): Low glycemic index dates (Zahidi), Medium glycemic index dates (Qarnaflī), High glycemic index dates (Medjool). Sample Description:

Variable	Zahidi		Qaranfali		Medjool	
	x	sd	x	sd	x	Sd
Age (years)	21.3	1.2 ±	21.5	1.4 ±	21.2	1.3 ±
Height (cm)	178.5	4.2 ±	179.1	3.8 ±	178.8	4.0 ±
Weight (kg)	72.4	5.3 ±	73.1	4.8 ±	72.8	5.0 ±

Table 1. Descriptive Characteristics of the Research Sample (Mean ± Standard Deviation)

Equivalence and Homogeneity

To ensure the accuracy of results, the equivalence of the groups was tested before the start of the experiment in the basic variables (age, height, weight), using a one-way ANOVA test

Variable	SS	df	MS	F	Sig
Age	0.84	2	0.42	0.31	0.73
Height	1.92	2	0.96	0.28	0.75
Weight	3.45	2	1.72	0.36	0.69

Table (2): Results Of The Homogeneity Test Between Groups Before The Experiment

Sig values greater than (0.05) indicate no statistically significant differences between the groups, which indicates their homogeneity and equivalence, a prerequisite for ensuring that subsequent differences are attributable to the independent variable (Field, 2013).

Group	Type of dates	Glycemic index	Timing of intake
First	Zahidi	Low	30 minutes before exercise
Second	Qaranfali	Medium	30 minutes before exercise
Third	Medjool	High	30 minutes before exercise

Table (3): Distribution Of Experimental Groups

Measurement Tools

Variable	Tool	Unit of measurement
Blood sugar	Glucometer	mg/dL
Insulin	Laboratory analysis	μIU/ml
Lactate	Lactate Analyzer	mmol/L
Physical performance	Yo-Yo Intermittent Recovery Test	Meter

Table (4): Measuring instruments used

Experimental Procedures

The experiment was conducted according to the following steps: PreparatoryPhase: Explaining the study objectives to the participants Obtaining written consent, Implementing a standardized diet 24 hours prior to the test, Restricting the intake of dietary supplements, Practical phase: Consume dates with an amount of (50–70 g of carbohydrates) 30 minutes before exercise (Cathryn R. Dooly & Arthur T. Johnson, 2014; Silva et al., 2025). Take measurements as shown in the following table.

Measurement Timing

Variables	Before intake	After 30 minutes	After exerciseAfter exercise
Blood sugar	✓	✓	✓
Insulin	✓	✓	✓
Lactate	✗	✗	✓
Physical performance	✗	✗	✓

Table 5. Measurement Timing

Tests Used

The Yo-Yo Test was used to measure physical performance, as it is one of the approved tests for assessing aerobic capacity in athletes (Pang et al., 2006a, 2006b; Silva et al., 2025). The data were analyzed using SPSS software, through: The data were analyzed using SPSS software by calculating the arithmetic mean and standard deviation, followed by a One-Way ANOVA test and an LSD post-hoc test to identify differences between groups. A significance level of 0.05 was adopted in this study, following Field (2013). data were analyzed using SPSS sofby calculating the arithmetic mean and standard deviation, followed by a One-Way confidentiality, and ensuring the participants' right to withdraw from the study at any time.

RESULTS AND DISCUSSION

First: Metabolic Response to Blood Glucose and Insulin

Variables	Group	x	sd	F	Sig
Blood glucose (mg/dL)	Zahidi	90	5 ±	4.32	0.02
	Qaranfali	95	6 ±	—	—
	Medjool	102	7 ±	—	—
Insulin (μIU/ml)	Zahidi	9.2	1.1 ±	5.12	0.01
	Qaranfali	10.0	1.3 ±	—	—
	Medjool	11.5	1.5 ±	—	—

Table. 6 Means and Analysis of Variance for Blood Glucose and Insulin

Table (6) shows that the blood sugar results indicate statistically significant differences between the groups, as the low glycemic index (Zahidi) date group recorded the lowest increase in blood sugar compared to the group in the table. This is due to the slow rate of carbohydrate absorption and the slow rate of glucose entering the bloodstream. These results are similar to those shown where low-glycemic foods lead to More stable metabolism and fewer drastic changes in blood sugar levels. In the case of insulin, the results have shown a higher increase in insulin levels in the high-glycemic (drug-filled) date groups, thus causing Greater insulin secretion in response to the faster increase in blood glucose level. This corroborates the findings of Jeukendrup which shows that fast-acting carbohydrates can result in higher levels of insulin secretion. It can be concluded that low glycemic-index dates are better suited to maintain metabolic stability during exercise.

Variables	Group	x	sd	F	Sig
Lactate (mmol/L)	Zahidi	6.8	0.9 ±	3.87	0.03
	Qaranfali	6.2	0.8 ±	—	—
	Medjool	7.1	1.0 ±	—	—
Physical performance (m)	Zahidi	12.50	80 ±	6.23	0.01
	Qaranfali	13.00	85 ±	—	—
	Medjool	12.80	90 ±	—	—

Table 7. Means and Analysis of Variance for Lactate and Physical Performance

Table (7) shows that the lactate results revealed significant differences between the groups, with the date group recording the lowest average glycemic index (pink) and lactate accumulation, indicating better energy efficiency. And it delays muscle fatigue. This is linked to a balance between glucose and fructose, allowing for a gradual and sustained release of energy, as noted by As for physical performance, the pink date group achieved the best results, which indicates that the balance in the glycemic index provides an ideal combination of quick and

sustained energy. Which confirmed that the type of carbohydrates directly affects These results are consistent with Physical performance and accumulation, and improve endurance performance.

Group	Before (m)	After (m)	Improvement rate %
Zahidi	1100	1250	13.6%
Qaranfali	1120	1300	16.0%
Medjool	1110	1280	15.3%

Table 8. Rates of development among groups

The evolutionary ratios indicate the superiority of the pink date variety, which recorded the highest improvement in physical performance. This can be explained by this variety's ability to achieve a balance between rapid energy supply and metabolic stability, as a result of Its composition combines monosaccharides. his balance also reduces rapid reliance on glycogen, thus prolonging performance before fatigue sets in.

CONCLUSION

In light of the study results and the statistical analysis using one-way ANOVA, the following conclusions can be drawn: The difference in the glycemic index of date varieties leads to significant differences in metabolic response, as low-glycemic index (Zahidi) dates showed better stability in blood sugar levels. Dates have a high GI and trigger a sudden elevation in blood sugar, resulting in increased levels of insulin released for providing instant energy. The dates with medium GI (pink) struck a better balance between metabolism and physical performance through lower levels of lactic acid formed during physical activity. The research revealed that carbohydrate intake had a significant influence on physical performance. The dates with medium GI (pink) struck a better balance between metabolism and physical performance through lower levels of lactic acid formed during physical activity. Performance in that glucose-to-fructose ratio helps boost energy production efficacy. Sports nutrition may include dates as a valuable source of natural foods because of their beneficial impact on physiological responses and performance.

RECOMMENDATIONS:

Based on the results obtained from the research, the following recommendations are proposed:

1. The consumption of low glycemic index dates before engaging in prolonged exercises since they help in stabilizing blood sugar levels.
2. Consume dates with a high glycemic index during exercise or shortly after to restore energy quickly.
3. For endurance and fast energy training programs, dates with a medium glycemic index, for example, carnation dates.
4. Coaches and nutritionists should be encouraged to incorporate dates into the diets of athletes as a supplement to synthetic substances.
5. Further research should be conducted with more participants, as well as incorporating other hormones and muscle fatigue markers.

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