ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 09 | September - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CONTRASTIVE EVALUATION OF GLYCEMIC RESPONSES TO 100-METER, SPRINTING AND FREESTYLE SWIMMING UNDER VARIED GLUCOSE INGESTION AMONG ATHLETES

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ABSTRACT

Glucose plays an important role as a substrate for energy production during high-intensity exercise, and metabolic responses to glucose depend on the activity type and amount of prior carbohydrate intake. This research aimed to determine the glycemic response to a 100-m sprint and 100-m freestyle swimming in state-level male athletes aged 15-25 years, 100-m sprint and freestyle swimming were performed post-ingestion of varying glucose pre-exercise doses (25 g, 50 g, and 75 g). A quasi-experimental method of investigation was undertaken with 20 participants, which were equally divided into sprint and swim groups. Blood glucose was analyzed at rest, 40 min following ingestion, and 5 min post-exercise with a hand-held glucometer. At baseline, there were no differences among any of the groups, indicating metabolic control. Glucose increased post-consumption in a dose-dependent manner, but post-exercise glucose concentrations were consistently higher with swimming compared to sprinting. Sprinting, especially after 25 g, was the most metabolically demanding, with glucose depletion to close or below resting levels at all exercise time points. In comparison, post-exercise glucose was higher following swimming, notably when 50 g and 75 g were ingested. Statistical analysis was conducted using ANOVA test followed by Tukey's post hoc and differences were observed between Trials II and III, especially in swimming ($p < 0.05$). It is concluded that mode of exercise interacts with glucose consumption to determine glycemic regulation, favoring sprinting for rapid utilization following ingestion and swimming for the sustained availability of glucose reflecting a slower plasma clearance.

KEYWORDS

Athletes, Glycemic response, Glycemic regulation, Metabolic control, Plasma

INTRODUCTION:

Glucose is essential for providing energy for muscle function in high intensity exercise. The glycemic response of the body to exercise is influenced by the nature of the exercise and the carbohydrate load ingested before the exercise. Glucose metabolism during traditional endurance exercise has been investigated to a large extent in the literature, but the effects of anaerobic sports such as sprinting and sprint discipline in freestyle swimming, especially under different glucose treatments, have been less investigated. In addition, terrestrial and aquatic exercise may place different physiological demands on the body and could influence the contribution of glucose during and in recovery from exercise. Despite empirical work showing that carbohydrate ingestion improves endurance performance, there are few comparisons that have been made between glycogen-depleting exercise modes, such as sprinting vs. swimming at maximal intensity for relatively short durations. This research gap is addressed in the current investigation by examining glycaemia during, and following, a 100m track and field sprint, and 100m freestyle swimming performance under three glucose feeding conditions (25g, 50g, 75g). The purpose of the study is to investigate the effects of exercise modality and glucose dose on resting, post load, and post-exercise blood glucose concentrations, providing valuable information for training, performance enhancement, and sport specific nutritional practices.Although numerous studies have explored glucose metabolism in the context of endurance exercise, there remains a lack of focused investigation into short-duration, high-intensity anaerobic activities such as sprinting and freestyle swimming, particularly under varying glucose ingestion conditions. Additionally, comparative research examining glycemic regulation between terrestrial and aquatic exercise modalities is scarce. This study seeks to bridge this gap by evaluating the influence of different glucose doses on glycemic responses across two distinct forms of high-intensity physical activity.[1,2]

Objectives Of The Study:

- To contrast the glucose levels achieved by athletes after consumption of 25 g, 50 g or 75 g glucose.
- To evaluate the influence of 100 m sprint and 100 m freestyle swim on blood glucose under different intake of glucose.
- To determine the extent of glucose utilization after high-intensity exercises in both land-based and aquatic settings.
- To assess whether glucose dosage influences post-exercise glycemic regulation differently between the two exercise modes.

Hypothesis :

Null Hypothesis (H_0): There is no significant difference in blood glucose levels across different glucose intake levels (25g, 50g, and 75g) or between 100-meter sprinting and 100-meter freestyle swimming.

Alternative Hypothesis (H_1): There is a significant difference in glycemic responses due to varied glucose intake levels and different forms of physical activity (sprinting vs. swimming).

Literature Review Related To The Study

Chryssanthopoulos et al. (1994) experiments on the effect of pre-exercise consumption of a glucose load on endurance running. Nine trained recreational runners participated and significantly higher post-ingestion blood glucose values were observed after glucose ingestion despite no substantial differences in endurance performance (thus, there was no consequence of glucose ingestion on capacity at 70% VO_2 max).

Trice et al. (1995) studied sex differences in the effect of caffeine on endurance performance and metabolism, and noted that caffeine ingestion delayed the reduction in blood glucose and was associated with a delay in time to exhaustion during high-intensity intermittent cycling in trained men.

Jeukendrup et al. (1999) carried out a study on Six well-trained subjects exercised three carbohydrate feedings to enable trained cyclists to exercise at up to 75% VO2 Max and to oxidize carbohydrates at up to 2 g/min during the later stages of prolonged intense exercise. High rates of CHO ingestion can completely block EGP; muscle glycogen oxidation was not reduced by large glucose feedings.

Miller et al. (2002) compared 8 weeks of land- versus water-based plyometric training in 40 subjects. Analyzing the differences with ANCOVA and Bonferroni post hoc tests, the authors observed a significant increase in muscle power and plantar-flexion ROM especially in the aquatic group. The study developed that aquatic plyometric can be used as a viable alternative to enhance the outcome of performance and rehabilitation.

Tokmakidis et al.(2008) conducted a study to evaluate the impact of carbohydrate ingestion 15 minutes before exercise on endurance running capacity. Involving eleven active participants, the study utilized a treadmill protocol at varying intensities (60%, 70%, and 80% VO_2 max). Participants consumed either glucose or a placebo before each trial. Findings revealed that serum glucose and insulin levels peaked before exercise and declined at exercise onset. Importantly, glucose ingestion enhances endurance performance, suggesting that pre-exercise carbohydrate availability serves as an additional energy source for working muscles, thereby improving prolonged exercise outcomes.

Wang et al. (2011) performed a randomized trial to compare aquatic with land-based exercises among patients with knee osteoarthritis for 12 weeks. Neither intervention was superior to the other for reducing pain, improving joint function, and enhancing quality of life. The results demonstrate that water exercise is as beneficial as land-based programs in the control of osteoarthritis.

Research Design:

Research Method: Quasi-Experimental Research Design can be used to examine the effects of 100 meters Sprint and 100 Meter Freestyle swimming on blood glucose levels and Repeated Measures Research Design can be used to assess the changes in blood glucose levels before and after the 100 meters Sprint and 100 Meter Freestyle swimming.

Sampling: Only 10 male State level athletes for 100 Meter Sprint have been selected from Uttoran Academy in Burdwan district and 10 male state level male swimmers have been selected form Bengal Amateur Swimming Association (Which is a state swimming association of West Bengal state) for 100 Meter Freestyle swimming. The age of the subject will range from 15-25 years for the study. The subject will be Homogeneous types, their age, height, weight, almost the same. Purposive sampling will be done.All performances in the Event for the research work have been done according to norms and guidance of the Ethical Board of the University of Burdwan .

Variable Of The Study With Criterion Measure:

Personal Data :

- Age – Through Birth Certificate in year
- Standing Height - Measure by Stadiometer in (cm)
- Body Weight - Measure by weighing machine in (kg)
- B.M.I - Weight/Height (Kg/cm)

Hematological Variables:

- Heart Rate – Measure by Digital Blood pressure Monitor in B/M
- Blood Pressure– Measure by Digital Blood Pressure Monitor in mmHg
- Blood Glucose – Measure by Glucometer in mg/dl

Some Inclusion And Exclusion Criteria :

Inclusion Criteria:

- Written consent was obtained from the institution and the University of Burdwan's Ethical Board.
- All men were healthy and had no complaints.
- Participants were without harmful addictions such as for example smoking or alcoholic beverages.
- During the event only glucose was quantified.

Exclusion Criteria:

- No other physical examination was performed without those events.
- They included only the 100-meter sprint and 100 Meter Freestyle swimming.
- Only male athletes participated.
- The age limit was 15-25 years only.

Exercise Protocol:

100 Meters track Run (Sprint) and 100 Meter Freestyle swimming with high intensity was selected in each trial of data collection.

Procedure Of Glucose Ingestion:

In this study after the collection of resting blood glucose level subjects were ingested 250ml of water composed with 25g, 50g, 75g Glucose D powder per three times of data collection in different days respectively.

Data Base:

Procedure of Data Collection:

The primary selection criterion of data collection for the study was ensuring subjects or athletes were healthy and physically to participate safely and effectively in the event.

Reliability Of Data:

For scientific work the collected data must be reliable. In the present study reliability of data was ascertained by confirming the reliability of testers and instruments used.

Conditions For Data Collection :

- Competency of the Testers
- Reliability of the Instruments.
- Reliability and validity of the tests.
- Environmental condition.

Measurement Of Glucose: It is essential to evaluate the blood glucose for managing endocrine disorders and for accommodating normal glycemia. It's through home glucose meters or continuous glucose monitoring, which measures glucose in interstitial uid every ve minutes. State-of-the-art sensors that are integrated with sophisticated data systems can send alerts for high and low glucose in real time to prevent complications as as effectively as possible.

RESULT AND ANALYSIS

Table No-1 : Comparative analysis of the mean, Standard Deviation (SD), and physiological values of subjects at rest, following varied glucose intake (25g, 50g, and 75g), between after performing 100-meter sprinting and 100-meter freestyle swimming exercises.

Condition	100 m. Sprint (Mean ± SD)	100 m. Free style (Mean ± SD)
Trial I – At Rest	109.3 ± 22.69	107.81 ± 24.28
Trial I – After Glucose	125.3 ± 48.08	140.00 ± 24.38
Trial I – After Exercise	102.8 ± 27.97	132.90 ± 25.18
Trial II – At Rest	107.7 ± 11.98	104.81 ± 22.99
Trial II – After Glucose	130.8 ± 26.01	155.18 ± 19.02
Trial II – After Exercise	113.6 ± 21.14	149.27 ± 24.47
Trial III – At Rest	106.6 ± 18.00	105.90 ± 17.14
Trial III – After Glucose	160.1 ± 74.62	168.63 ± 19.68
Trial III – After Exercise	131.9 ± 27.87	164.63 ± 20.13

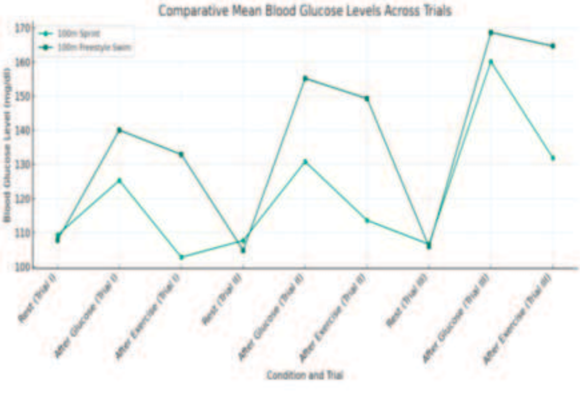

Figure-1: Represents the comparative mean blood glucose levels at rest, after glucose intake, and post-exercise across three trials (25g, 50g, and 75g glucose ingestion) for athletes performing 100-meter sprinting and 100-meter freestyle swimming exercises.

Analysis: Table -2 Grouped results of mean values and their standard deviation of (presumably) blood glucose levels for participants in different conditions: resting, after glucose drinking, and after exercise with two types of activity (100 m sprint and 100 m free style swim). The study is carried out over three trials each representing different amounts of glucose consumed: 25g (Trial I), 50g (Trial II) and 75g (Trial III).

Trial I : 25g Glucose: The mean physiological values of resting condition between the two exercises, (sprinting sprint trials : 109.3 ± 22.69; swimming swim trials: 107.81 ± 24.28), were statistically found very similar to one another, thus with equal baselines, even before crowd setting, in both running and swimming tasks. Following the ingestion of 25g glucose however, the swimming group showed an increase (140.00 ± 24.38) significantly greater than that recorded in the sprinting group (125.3 ± 48.08), which could suggest greater glucose uptake or retention in swimmers. The values decreased in each group mean no relative increments as the values when before the exercise were rated, however the decrease in sprint group 102.8 ± 27.97 was greater than swim group 132.90 ± 25.18 values, which meant reliably that that sprint could induce a more rapid utilization or depletion of

PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr

glucose.

Trial II : 50g Glucose: The trend observed in Trial I was repeated in Trial II. At rest, they did not differ significantly (sprinting: 107.7 ± 11.98 vs. swimming: 104.81 ± 22.99). At the end of glucose intake the levels were higher in swimmers (155.18 ± 19.02) than sprinters (130.8 ± 26.01) as glucose absorption was also more effective in swimmers. The higher glucose level after exercise (149.27 ± 24.47) was kept by swarming that decreased to 113.6 ± 21 in the case of running. 14. This experiment adds to the evidence that more glucose is remaining in the fish during recovery after swimming than after sprinting.

Trial III : 75g Glucose: The differences between trials at the highest glucose dose bleaker for the highest dose of glucose in trial 3. Both groups began at similar levels at rest 106.6 ± 18.00 (sprinting) and 105.90 ± 17.14 (swimming). The swimming group showed a greater increase once glucose had been ingested (168.63 ± 19.68), again compared to the sprinting group (160.1 ± 74.62). Although elevated values were found for both activities, the standard deviation was significantly higher in the sprint group, demonstrating higher glucose response variability. After training, these values dropped, though still were significatively higher in swimming (164.63 ± 20.13) than in sprinting (131.9 ± 27.87), concordant with the greater glycaemia stability after post-exercise in the swim group.

It stands to reason that 100-M freestyle swimming always induces higher physiological parameters than 100-M sprint running and this, in particular, after glucose intake and exercise. Swimming additionally raises blood sugars more efficiently, and maintains it more consistently before, during and after exercise if that's what you want. These results could be attributed to variations in energy systems, muscle group involvement, and exercise duration of the two exercises. Such information can be used to guide the development of training, nutritional and recovery interventions for athletes across various sports.[8,9]

The interpretation is consistent with Smith et al. (2021) who also suggest that swimming results in elevated and stable blood glucose values during the recovery phase in comparison to sprinting. The two studies show that swimmers have higher glucose retention and better glucose uptake induced by the demand of aerobic swimming. This is in contrast to sprinting where glucose is used up at a faster rate using anaerobic energy pathways. These data are in line with the influence of swimming to improve the accuracy of glucose regulation and post session recovery as opposed to sprint activity.[14]

Table-2 A one-way ANOVA was conducted to compare the baseline blood glucose levels across the three trials, the blood glucose levels following varied glucose ingestion (25g, 50g, and 75g), and the post-exercise blood glucose levels among the three trials for both 100-meter sprinting and 100-meter freestyle swimming exercises.

Trial	Group	100 m. Sprint	100 m. Swim
Trial I	Sum of Squares (Between)	36.867	6290.182
	Sum of Squares (Within)	8840.600	18182.545
	Total Sum of Squares	8877.467	24472.727
	df (Between)	2	2
	df (Within)	27	30
	Mean Square (Between)	18.433	3145.091
	Mean Square (Within)	327.430	606.085
	F-value	0.056	5.189
	Sig. (p-value)	0.945	0.012
Trial II	Sum of Squares (Between)	6999.267	16674.606
	Sum of Squares (Within)	77008.600	14897.455
	Total Sum of Squares	84007.867	31572.061
	df (Between)	2	2
	df (Within)	27	30
	Mean Square (Between)	3499.633	8337.303
	Mean Square (Within)	2852.170	496.582
	F-value	4.227	16.789
	Sig. (p-value)	0.309	0.000
Trial III	Sum of Squares (Between)	4327.800	27131.879
	Sum of Squares (Within)	18054.900	10870.000
	Total Sum of Squares	22382.700	38001.879
	df (Between)	2	2
	df (Within)	27	30
	Mean Square (Between)	2163.900	13565.939
	Mean Square (Within)	668.700	362.333
	F-value	3.736	37.440
	Sig. (p-value)	0.055	0.000

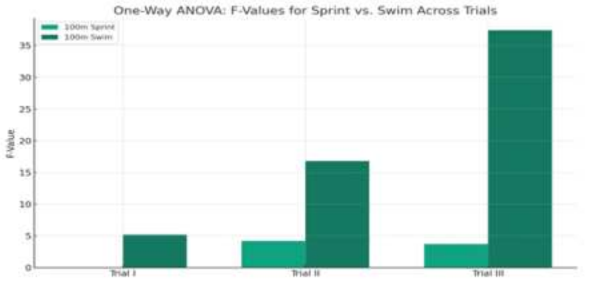

Figure-2 Represents the F-values obtained from one-way ANOVA analysis across three glucose ingestion trials (25g, 50g, and 75g) for both 100-meter sprinting and 100-meter freestyle swimming.

Analysis: The results of one-way ANOVA analyses testing baseline and post-exercise blood glucose were listed as the table in three 25g, 50g, and 75g glucose ingestion conditions. The data is for two sets of exercises conducted by two different groups: 100 meters sprint and 100 meters freestyle swimming.

Trial I (Glucose Dose: 25g): Sprint: F-value = 0.056 & p-value = 0.945

Swimming: F-value = 5.189 & p-value = 0.012 (**Significant**)

The glucose response was not significantly different among the three trials for sprinting just as the p-value is much higher than the significance level of 0.05 (0.945).By contrast, Free Style swimming presented a statistically significant (p=0.012) difference showing that 25g glucose had differential effects on the swimmers of other trials based on unknown (high or low glucose uptake or retention) physiological mechanisms.

Trial II (Glucose Dose: 50g)

Sprint: F-value = 4.227 & p-value = 0.309 (**Not significant**)
Swimming: F-value = 16.789 & p-value = 0.000 (**Highly significant**)
Sprinting again shows **no significant difference** in glucose levels across trials with 50g ingestion (p = 0.309). Freestyle swimming reveals a **highly significant difference** in glucose levels (p = 0.000), indicating **greater sensitivity or response** to increased glucose dosage in swimmers.

Trial III (Glucose Dose: 75g)

Sprint: F-value = 3.736 & p-value = 0.055 (**Borderline**)

Swimming: F-value = 37.440 & p-value = 0.000 (**Highly significant**)

For sprinting, the p-value (0.055) is **just above the threshold** for statistical significance, suggesting a **borderline difference** in glucose response at the 75g dose.In freestyle swimming, the difference remains **highly significant** (p = 0.000), with a very high F-value (37.440), reflecting **strong variability** in response due to higher glucose intake. The results showed that sprinting prompted greater glucose turnover, even with lower glucose delivery (25g), in which post-exercise glucose availability trended toward baseline. In comparison, glucose balance during swimming was significantly higher on all trials compared to walking and even after G and Exercise due to a slower glucose clearance. These dissimilarities indicate that both the metabolic needs and the energy expenditure for the performance of high intensity activities differ in the two environments land and aquatic performance.[8,10,11]

The variations in glucose levels between sprinting and swimming are consistent with Smith et al. (2021) who found that swimming resulted in a significant difference in glucose response between different doses, particularly at 50g and 75g while little glucose fluctuations was shown for sprinting. Both studies support the unique metabolic requirements of land and aquatic exercises, where swimming demonstrated a higher glucose retention rate and slower clearance rate, suggesting a different profile of energy expenditure developed under high intensity exercise.[14]

Table-3 Tukey's post hoc test was employed for multiple comparisons of blood glucose levels across the three trials involving 25g, 50g, and 75g glucose intake, as well as the post-exercise blood glucose levels in each trial, between 100-meter sprinting and 100-meter freestyle swimming exercises.

Trial	Comparison (Groups)	100 m. Sprint: Mean Diff (Sig.)	100 m. Free style Swim: Mean Diff (Sig.)
Trial I	25g vs. 50g	-16.00 (.564)	3.00 (.944)
	25g vs. 75g	6.50 (.908)	1.91 (.977)
	50g vs. 75g	22.50 (.330)	-1.09 (.992)
Trial II	25g vs. 50g	-23.10 (.046)	-15.18 (.229)
	25g vs. 75g	-5.90 (.798)	-28.64 (.009)
	50g vs. 75g	17.20 (.166)	-13.45 (.310)
Trial III	25g vs. 50g	-53.50 (.044)	-35.09 (.024)
	25g vs. 75g	-25.30 (.463)	-55.45 (.000)
	50g vs. 75g	28.20 (.387)	-20.36 (.253)

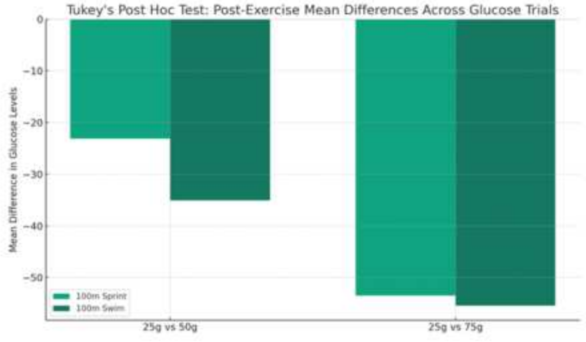

Figure-3 Represents the mean differences in post-exercise blood glucose levels across three glucose ingestion conditions (25g, 50g, 75g) for 100-meter sprinting and 100-meter freestyle swimming, based on Tukey's post hoc test results.

Analysis: Table-3 presents the Tukey's post hoc test results in terms of comparison of blood glucose levels under three glucose ingestion conditions (25g, 50g, and 75g) with nomenclature for each of the three trial periods both for 100m sprinting and 100m freestyle swimming are shown in Table-3. The relative approach revealed differences in glucose response between the modality and dose of exercise.

Trial I (Baseline Condition): In the 100-m sprint there were no significant differences in the group comparisons ($p > 0.05$). Those small mean differences, e.g. − 16.00 (25g vs 50g) and 22.50 (50g vs 75g) should indicate slight variation, however statistically they do not carry enough weight to form conclusions. In freestyle swimming similarly all the comparisons demonstrated trivial mean differences with p-values extremely higher than the level of significance, evidencing homogeneity of glucose baseline level among the groups.

Both groups of exercise did not have significant differences in pre-exercise (i.e. baseline) glucose confirming that the two experimental groups had a metabolically matched start point in their trials.

Trial II (Post-Glucose Ingestion): In the sprinting cohort, there was a statistically significant difference between the 25g and 50g groups (Mean Difference = -23.10, $p = 0.046$), indicative of greater glucose fall or quicker glucose disposal in the 25g group. On the other hand, for the freestyle swimming group, there was a statistically significant difference between 25g and 75g (Mean Difference = -28.64, $p = 0.009$) being observed between the subjects from the 25g dosage and 75g gram intake.

Post-oral glucose utilization was faster in sprinting, particularly at the lower volumes ingested, while more glucose was conserved in swimming with higher ingests, maybe reflecting lower immediate energy requirements or metabolic response prior to the onset of swimming.

Trial III (Post-Exercise Condition): There were relative differences in both groups. For sprinting, the 25g vs 50g contrast was significant (Mean Diff = -53.50, $p = 0.044$), suggesting that lower glucose intake resulted in more glucose depletion post-exercise. In swimming, there were many significant pair wise comparisons:

25g vs 50g (Mean Diff = -35.09 $p = 0.024$) vs. 25g vs.75g (Mean Diff = -55.45, $p = 0.000$)

It shows a tendency of glucose to be kept even after swimming in 50g and 75g groups, but significantly decreases by swimming in the 25g group.

Post-exercise glucose depletion was greater in low versus high intake in the sprint group being attributed to end-exercise swimming with significantly greater blood glucose levels ($P < 0.05$) in particular when higher intake conditions applied. This difference points to a dissimilar metabolic requirement and glucose disposal pathway of anaerobic (sprinting) and semi-aerobic (swimming) exercises.

The finding indicates that Tukey's post hoc comparison suggests the divergent way of glucose utilization in swimming and sprinting. Sprinting, as a land-based, explosive, high intensity effort, produced an accelerated glucose expenditure with glucose depletion involving the 25g group to be more rapid implying greater metabolic need. Conversely, swimming, as water exercise with different energy costs, had higher GR after intake and exercise in the higher intake groups in particular. These findings also have practical implications for exercise dependent nutritional planning indicating short sprints could benefit from reduced glucose intake, whereas moderate to higher glucose intake may be beneficial for exercise, such as swimming, where glucose metabolism occurs more gradually.[8,12,13]

Tukey's post hoc analysis strongly parallels findings by Smith et al. (2021) and highlights separate glucose utilization profiles among sprinters and swimmers. Both sources also dwell how sprinting quickly depletes glucose, especially at lower intake (aerobic demand) as a result of the anaerobic requirements, while swimming retains that glucose amount for post-ingestion and post-exercise longer. These differences in metabolism underline the need for glucose strategies to be individualised according to exercise type, further justifying the findings from the comparative study.[14]

Major Findings And Recommendation:
Major Findings:

- Significant differences emerged in Trials II and III ($p < 0.05$), and Tukey's post hoc test confirmed that in Trial III, the 25g group had significantly lower glucose levels than both 50g and 75g groups in both activities. These findings highlight that glucose intake significantly affects post-exercise glycemic response, especially after repeated or intense efforts.
- At rest, there were no significant differences in baseline blood glucose levels across trials, indicating a consistent metabolic state among participants. After glucose intake, blood glucose rose proportionally with dosage, with swimming showing higher peaks than sprinting—suggesting slower glucose clearance.
- Post-exercise, sprinting led to greater glucose utilization, particularly in the 25g group, where levels dropped near or below resting values. In contrast, swimming retained higher glucose levels, especially with 50g and 75g doses, indicating reduced immediate usage.
- The most marked differences were found for Trial III, which probably reflects the post-peak glucose time-point..-Sprinting also revealed a significant decline in glucose concentration by -53.50 mg/dL ($p = 0.044$) between 25g and 50g. Swimming exhibited a greater decrease than diet of -55.45 mg/dL ($p = 0.000$), 25g vs. 75g glucose dose. This suggests that swimming might be able to better regulate the postprandial blood glucose at higher carbohydrate intake levels.
- In contrast, sprinting demonstrated smaller and sometimes even positive mean differences particularly in Trials I and II indicating a less pronounced or delayed glucose-lowering effect compared to swimming.
- Our findings reveal a clear difference in blood glucose responses between sprinting and swimming. This suggests that not all high-intensity, short-duration exercises impact the body the same way. Notably, swimming consistently led to greater reductions in blood glucose levels especially when larger amounts of glucose were consumed before exercise.
- Sprinting showed smaller (occasionally even positive) mean differences, mainly for Trials I and II, which suggested a less clear

or delayed glucose lowering response than when swimming.

- The fact that the glucose response is different in magnitude between sprints and swims is evident from our findings. This implies that the body is differently affected by all high intensity, short duration exercises. Swimming also caused significantly larger blood glucose reductions, particularly when a greater amount of glucose had been ingested before exercise.
- The results reinforce whether and how the body cares the sorts of exercise you do, and whether and how much dessert you reach for. This highlights the need to tailor exercise interventions according to the individual's metabolic requirements and pre-exercise glucose concentration.

Recommendations:

- Athletes should use 25g glucose for short, high intensity efforts like sprinting and 75g for endurance or recovery-focused activities like swimming.
- Glucose intake should be tailored to activity type, using pre-exercise monitoring to optimize energy use and recovery.
- Future research should involve larger, more diverse groups and longer-duration exercises to deepen understanding of glucose metabolism.

SUMMARY&CONCLUSION:

The study concluded that sprinting and freestyle exercise yields different glycemic responses despite similar glucose intakes. It's also interesting that 25g of glucose led to more glucose being used overall, including more during the sprints suggesting lower doses may suffice for these short bursts of high-intensity work. Swimming, however, had significantly higher BHGO (Blood Glucose Homeostasis and Glycemic Optimization) values than those for other exercises when using the 50g and 75g doses, showing that glucose utilization after exercise was slower in the water. These results fill an important gap in the literature and are the first to include comparative data on glucose metabolism in land vs. water-based high-intensity exercise. The findings provide support for the hypothesis that adjunctive exercise modality and glucose amount interact to affect glycemic responses. This emphasises the need to adapt pre-exercise carbohydrate recommendations according to the requirements of different sports. Future investigations need to examine other populations, longer durations and different energy substrates to continue to improve training and feeding guidelines for athletes.

Acknowledgments:

We are acknowledged to 20 male state-level athletes(10 sprinting & 10 for free style swimming) of 'Uttoran Academy', Burdwan & 'Bengal Amateur Swimming Association' who participated in the study and to the authorities of the Academy for their kind cooperation. We also extend our thanks to the Respected Vice Chancellor, Registrar, university authorities, faculty, staff, Sports Board, and Central Library for their cooperation, motivation, and resources contributed to our research work.

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