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Exercise in children with diabetes

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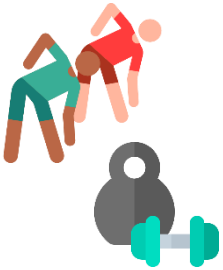
It is important for a diabetic person to exercise, as it brings many benefits, including:

- Improving the ability to control blood sugar

- Exercise helps control weight, which reduces the risk of cardiovascular disease

- Improved sense of wellbeing.

Exercises include :



- Moderate to vigorous aerobic activity,
- Muscle strengthening exercise
- Bone strengthening activities.

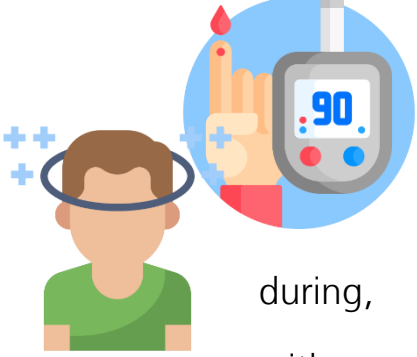
Although sports help control blood sugar and improve physical health, it is forbidden to exercise in these cases:

When blood sugar is high, to avoid ketoacidosis

When you have noticeable low blood sugar readings for a week

When you have more low sugar levels (honeymoon phase), which often occurs at the beginning of the diagnosis

- **Glucose monitoring:**



Measurements of glucose should be taken before, during, and after the end of exercise with attention paid to the direction of change in glycaemia.

The blood sugar before exercise should be between 90 to 150

- **Hyperglycemia**

- Hyperglycemia might occur during exercise of high intensity, but generally also after excessive carbohydrate intake or too large insulin dose reductions.

- During competitions, stress release some hormones may also result in hyperglycemia. If this situation occurs use a correction dose.

- **Hypoglycemia**

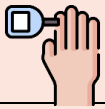
Hypoglycemia is an important consideration when planning exercise with diabetes. Hypoglycemia can occur during, immediately after, or with prolonged delay after exercise and even during sleep.

- **Suggested modifications to insulin doses:**

exercise type	Pre-workout meal		Meal after exercise
	The duration of the exercise is 30-45 minutes	**The duration of the exercise is more than 45 minutes**	
Moderate to vigorous aerobic activities such as swimming, running and football	25%-50% reduction in the dose of rapid-acting insulin (insulin meals)	50%-75% reduce the dose of rapid-acting insulin (insulin meals)	50% reduction in the dose of rapid-acting insulin (insulin meals)
Aerobic exercises with anaerobic exercises such as basketball, weight-bearing exercises, pull-ups and squats	25% reduction in the dose of rapid-acting insulin (insulin meals)	50% reduction in the dose of rapid-acting insulin (insulin meals)	50% reduction in the dose of rapid-acting insulin (insulin meals)

- Reducing the dose of long-acting basal insulin the night before the day of physical activity by 20% of the usual dose with the addition of carbohydrates.
- Reduce by 30% - 50% the night before intense exercise or in the same day dose with the addition of carbohydrates.

- **Tips to avoid low blood sugar while exercising**

measure glucose before start of exercise 
Don't forget to bring a glucagon syringe
Always bring snacks that contain carbohydrates 
Increase the intensity and/or the duration of the exercise progressively
In the few hours preceding the exercise, ingest slowly absorbing carbohydrates 
In the case of unforeseen physical activity decrease the insulin dose during and after intense muscular activity
Do not inject insulin at a site that will be heavily involved in muscular activity 
When physical activity is planned at a time of peak insulin action, a marked reduction of the insulin dose should be made
Measure the blood glucose value before bedtime on the evening after major physical activity and make sure to add extra carbohydrates and/or reduce long-acting/basal dose to reduce the risk of nocturnal hypoglycemia 
Measure your blood sugar after each change in insulin dose

- **Ketones:**

B-Ketones 	B-Glucose ≤14 mmol/l (≤252 mg/dl)	B-Glucose >14 mmol/l (>252 mg/dl)	B-Glucose 
B-Ketones ≥ 1.5 mmol/l	Add carbohydrates + insulin and give ½ correction dose of insulin with pen or syringe Act according to plan	Give ½ correction dose of insulin with pen or syringe Act according to plan	Avoid Exercise
B-Ketones1.1 – 1.4 mmol/l	Add carbohydrates + insulin and give ½ correction dose of insulin with pen or syringe	Give ½ correction dose of insulin with pen or syringe	Wait 60 min after correction and ensure decreasing glucose value Then OK to Exercise
B-Ketones 0.6 – 1.0 mmol/l	Add carbohydrates + insulin and give ½ correction dose of insulin with pen or syringe	Give ½ correction dose of insulin with pen or syringe	Wait 15 min after correction Then OK to Exercise

You can exercise if your blood ketones are less than 0.6 mmol/L and there are no symptoms of ketoacidosis and a blood sugar reading between 150-180 mg/dL

Sources and References:

ISPAD Clinical Practice Consensus Guidelines 2018: Exercise in children and adolescents with diabetes

Review and audit:

The content of this booklet has been reviewed by pediatric endocrinology and diabetes consultants at King Fahad University Hospital

Health Awareness Unit

IAU-21-189

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