International Diabetes Federation

# Physical activity

Section 2 | Part 5 of 6

Curriculum Module III–4 | Physical activity

Slides current until 2008

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**ACTIVITY**

What are the health benefits of establishing and maintaining regular physical activity?

Why is it particularly important to promote physical activity in people with diabetes?

Discuss the cultural and environmental barriers to physical activity in your community if they exist.

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## Health benefits of physical activity /1

- Reduces total cholesterol levels
- Increases HDL levels
- Reduces blood pressure levels
- Reduces joint pain and stiffness in osteoarthritis
- Reduces the risk of coagulation abnormalities





## Health benefits of physical activity /2

- Reduces obesity
- Reduces risk of colon and other cancers
- Improves intermittent claudication
- Improves cardiovascular health
- Reduces coronary artery disease

## Health benefits of physical activity /3

- Improves work, recreational and sports performance
- Decreases number of 'sick' days
- Decreases fatigue in daily activities, improves mood and self-esteem
- Improves quality of sleep
- Decreases stress
- Encourages social interaction
- Enhances quality of life





## Health benefits of physical activity in type 2 diabetes

- Improved insulin sensitivity and therefore better blood glucose control
- Increased glucose utilization
- Decreased glucose production from the liver
- Decrease in circulating insulin levels during exercise

# Physical activity in the prevention of type 2 diabetes

| Study | Characteristics & duration | Intervention | Results |
|---|---|---|---|
| Da Qing Study (China) 1997 | 577 persons >25 years<br>Random selection from clinics<br>6 years follow-up | Diet<br>Exercise<br>Diet + exercise | 68% cumulative incidence<br>44% (reduction of 31%)<br>41% (reduction of 46%)<br>46% (reduction of 42%) |
| Finnish Diabetes Prevention Study (Finland) 2001 | 522 persons, 40-64 years<br>BMI >25<br>Random selection by persons<br>3.2 years follow-up | Diet + exercise | 58% decreased incidence in the 'diet + exercise' group |





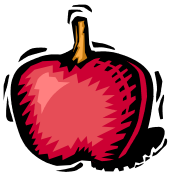
# Physical activity in the prevention of type 2 diabetes

| Study | Characteristics & duration | Intervention | Results |
|---|---|---|---|
| Diabetes Prevention Programme (USA) 2002 | 3234 persons =>25 years, BMI =>22 (Asian people), =>24 (other groups), random selection<br>2.8 years follow-up | Placebo<br>Metformin<br>Diet + exercise | 31% decreased incidence of diabetes in the metformin group<br>58% decreased incidence in the 'diet + exercise' group |

## Physical activity and food

Exercise combined with caloric restriction

- Modifies visceral fat and distribution of body fat
- Increases muscle mass



Apple shape

Pear shape





## Types of exercise

Aerobic exercise uses large muscle groups and requires oxygen for sustained periods

Anaerobic (resistance) exercise uses large muscles which do not require oxygen for short periods of exercise

## Yoga

- Yoga helps to reduce stress by lowering counter-regulatory hormones
- This improves the insulin sensitivity and thereby lowers blood glucose
- Advantage: does not cause hypoglycaemia as with other types of exercise





## Recommendations

- People with type 2 diabetes should accumulate 150 minutes of moderate-intense aerobic exercise each week, spread over 3 non-consecutive days
- People with diabetes should be encouraged to perform resistance exercise 3 times a week

CDA 2003

## Recommendations

- The American College of Sports Medicine recommends 20 to 60 minutes of exercise most days a week
- Aerobic exercise, such as walking, jogging, swimming, skipping, bike riding, should be sufficient to raise the pulse or increase respiration
- In resistance training, it is better to use repetitive light weights than heavy weights





## Exercise guidelines in accordance with fitness level

- Sedentary
  - walking (2-2.5 mph/3.2-4 km/h)
  - household activities, walking downstairs
  - gardening (lifestyle exercise)
- Active
  - walking (3-3.5 mph/ 4.8-5.6 km/h)
  - light swimming, dancing, aquagym
  - walking up and down the stairs
- Trained
  - walking (4-5.5 mph/ 6.4-8.8 km/h)
  - moderate swimming
  - energetic dancing
  - tennis (singles), rowing

## Tips to help start physical activity

- Identify an activity that will be enjoyed
- Start slowly, perhaps 5-10 minutes at a time
- Increase duration and intensity slowly
- Consider doing exercise in a group or with a partner
- Prevent boredom by varying the activities
- Set realistic goals
- Encourage people to reward themselves when goals are met





## Advice before starting exercising

For people who have not been active:

Physical check-up

- Cardiovascular
- Peripheral arterial disease, intermittent claudication, decreased or absent pulses, etc.
- Peripheral and autonomic neuropathy
- Nephropathy
- Blood pressure
- Retinopathy

## Advice before starting exercising

- Drink adequate amounts of water
- Ensure that footwear is appropriate to protect feet from injury and keep them dry
- Wear some form of diabetes identification, such as a bracelet or necklace
- Ensure exercise partners know how to recognize and treat hypoglycaemia





## Advice before starting exercising

- Test blood glucose prior to activity
  - if blood glucose >14mmol/L (252mg/dl), do not exercise
  - check for ketones in case of type 1 diabetes
  - if blood glucose <6mmol/L (108mg/dl), eat 15 grams of carbohydrate
- Have glucose source readily available throughout the activity
- Special precautions need to be taken where treating hypoglycaemia would be difficult, such as scuba diving, hang gliding, rock climbing

**ACTIVITY**

- What opportunities are available in your community for physical activity?
- What would you advise people with diabetes to do if they expressed an interest in starting some physical activity?





## Precautions – type 1 diabetes

- Risk of hypoglycaemia
  - exercise over extended period usually requires additional source of carbohydrate during the activity
  - intense exercise may require additional source of carbohydrate before, during and after the activity
- Hypoglycaemia may occur up to 24-36 hours following the activity
- Insulin may need to be decreased before and after exercise
- A snack before bedtime should be considered

## Precautions – type 1 diabetes

- The effects of unplanned exercise should be considered
- Risk of hyperglycaemia
  - rise in blood glucose following exercise indicates insufficient insulin at the time of exercise
  - blood glucose levels should be monitored closely and insulin adjusted accordingly
  - people should be advised not to exercise if ketones are present





## Precautions – type 2 diabetes

- Risk of hypoglycaemia is reduced but still present
- Cardiovascular events
- Consider other co-morbidities and diabetic complications

# Peripheral and autonomic neuropathy

Recommended

- non-weight-bearing activities
- swimming
- bicycling
- rowing
- chair and arm exercises

Contraindicated

- treadmill
- prolonged walking
- jogging
- step exercises





# Nephropathy

Recommended

- Low to moderate intensity forms of exercise

Contraindicated

- High intensity forms of exercise

## Diabetic retinopathy

| Recommended | Contraindicated |
| --- | --- |
| • Low-impact cardiovascular conditioning, such as swimming, walking, low-impact aerobics, stationary cycling, endurance exercises | • Strenuous activities, pounding or jarring, such as weight lifting, jogging, high-impact aerobics, racquet sports. |





## Summary

- Physical activity should be encouraged in all people with diabetes
- People need to be educated about prevention and treatment of hypoglycaemia
- People should be taught to plan for periods of physical activity

## Review question

1. A benefit of physical activity specific to type 2 diabetes is that it:

   a. Builds strong bones
   b. Increases insulin sensitivity
   c. Lessens stress
   d. Decreases risk of injury





## Review question

2. What advice would you give to your friend Alice, who has type 1 diabetes, prior to starting a game of squash when her blood glucose measures 4.4mmol/L (79.2mg/dl)? Should she:

   a. Administer 5 units of soluble insulin, wait 5 to 10 minutes then test again
   b. Start her squash match, and stop if she develops symptoms of hypoglycaemia
   c. Eat an easy to digest carbohydrate snack, wait 5 to 10 minutes and test again
   d. Warm up properly, stretch and ease into her match

## Review question

3. Examples of aerobic physical activities include:

   a. Brisk walking, raking leaves
   b. Tennis, weight lifting
   c. Dancing, carrying school books
   d. Resistance exercises, swimming





## Review question

4. Louis has not done any sort of physical activity for years. He has just been diagnosed with type 2 diabetes and decides to start exercising. Which of the following would you advise him to do?

   a. Buy a bicycle and start with 30 minutes every evening
   b. Think of an activity he enjoyed in the past and determine if he could do that again
   c. Start doing heavy weight lifting
   d. Not to start now as his heart may not be strong enough

## Review question

5. Marie has just been diagnosed with type 1 diabetes. She asks about the benefits of physical activity. Which of the following are beneficial in type 1 diabetes?

   a. It improves insulin sensitivity
   b. It increases glucose utilization
   c. It increases glucose production from the liver
   d. It improves lipid levels





## Answers

1. b
2. c
3. a
4. b
5. b and d

# References

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