Obstructive sleep apnoea: its link with diabetes

Definition of obstructive sleep apnoea (OSA)
The link with diabetes
How to treat OSA

In this article...

Health professionals need to make the connection between obstructive sleep apnoea and diabetes to ensure that patients receive the right care.

Keywords: Obstructive sleep apnoea/ Diabetes/Continuous positive airway pressure

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During normal breathing, there is no restriction on airflow to and from the lungs. However, airflow can be restricted by a large tongue, adenoids or excess fat around the neck (Fig 1). In obstructive sleep apnoea (OSA), breathing is interrupted during sleep. Two types of breathing interruptions in people with OSA have been defined:

- **Apnoea**: The muscles and soft tissues in the throat relax and collapse sufficiently to cause a total blockage of the airway. It is called an apnoea when the airflow is blocked for 10 seconds or more.

- **Hypopnoea**: A partial blockage of the airway that results in an air flow reduction of greater than 50% for 10 seconds or more. Because episodes of hypopnoea occur during obstructive sleep apnoea, doctors sometimes refer to the condition as "obstructive sleep apnoea-hypopnoea syndrome". Its severity is measured using the Apnoea-Hypopnoea Index (AHI) (Scottish Intercollegiate Guidelines Network, 2003).

Both apnoeas and hypopnoeas are associated with a drop in oxygen levels in the blood (oxygen desaturation is typically greater than 4%). Treatment using continuous positive airway pressure was developed in the 1980s.

Sleep

Sleep is driven by natural brain activity and people need to have a certain amount of deep sleep if their bodies and minds are to be fully refreshed. To function properly, most adults need seven to eight hours of sleep a night.

Having only limited episodes of deep sleep will leave individuals feeling tired the next day.

Around 15-25% of that time should be spent in the deepest phase of sleep, known as slow wave sleep, which occurs in the early sleep period. Sleep is associated with muscle relaxation which makes the airway vulnerable to obstruction.

5 key points

1. At least four in every 100 middle-aged men and two in 100 middle-aged women have OSA.

2. OSA and type 2 diabetes have shared risks around obesity, age and ethnicity.

3. Because all types of diabetes are increasing, the prevalence of OSA is also likely to rise.

4. Continuous positive airway pressure (CPAP) is the most common treatment for OSA.

5. It is important to be able to identify local referral pathways so people with OSA access the right care.

Fig 1. RESTRICTED AIRFLOW

Airflow can be restricted by a large tongue, adenoids or excess fat around the neck.
**What happens during OSA?**

During the night, people with OSA may experience repeated episodes of apnoea and hypopnoea. The lack of oxygen causes people to come out of deep sleep and into a lighter state of sleep or a brief period of unperceived arousal to restore normal breathing. After falling back to sleep, people have further episodes of apnoea and hypopnoea. Such events may occur throughout the night.

Interruptions to sleep caused by OSA can make people feel very tired during the day but they will usually have no memory of breathlessness, so are often unaware they are not getting a proper night’s sleep.

It is now mandatory for people to inform the Driver and Vehicle Licensing Authority if they have OSA as excessive sleepiness increases the risk of sleeping at the wheel and consequently the risk of a road traffic accident (DVLA, 2011).

**How common is OSA?**

OSA is a relatively common condition that affects men more than women.

In the UK, it is estimated that around four in 100 middle-aged men and two in 100 middle-aged women have OSA, but this may be an underestimate as obesity is common and closely associated with obstructive sleep apnoea. Given the obesity prevalence, as many as a quarter of adults may have various degrees of OSA.

Its onset is most common in people aged 35-54, although it can affect people of all ages, including children. It often goes undiagnosed. Only one in four people with obstructive sleep apnoea are diagnosed with the condition. Studies have also shown that 60% of people over 65 years old have OSA (Malhotra and White, 2002). The clinical impact of OSA is outlined in Box 1 and indications in Box 2.

**Link with diabetes**

There is a strong link between OSA and type 2 diabetes – they have shared risks of obesity, age and ethnicity. The risk of having OSA and/or type 2 diabetes increases with weight gain, as you become older, and if you are from a black or Hispanic background.

In most cases of type 2 diabetes, obesity is a major factor. A study by Foster et al (2009) found that a 10% weight gain was associated with an approximate 32% increase in AHI. The authors suggested that physicians should be aware of the likelihood of OSA in obese patients with type 2 diabetes, especially among those with a large waist circumference and high BMI. It has been suggested that OSA aggravates diabetes but, conversely, type 2 diabetes might itself result in OSA by altering breathing control during sleep (Foster et al, 2009).

A number of clinical observations are carried out at both the annual review and other consultations for people with diabetes. When a person with diabetes has poor glycaemic control or mentions problems with sexual function, headache or heartburn, there is a risk that pharmacological treatment could be prescribed without looking for the underlying cause, one of which could be OSA. We should be looking for additional indicators such as:

- Observed cessation of breathing (by a partner);
- Neck circumference; shirt collar size (≥17 inches in men; ≥16 inches in women).

**Treatment**

A number of treatments reduce OSA. The most common is continuous positive airway pressure (CPAP). This provides a splint for the airway during expiration to stop its collapse. Maintaining a clear airway using CPAP has been shown to be highly effective way of treating OSA and is endorsed by the National Institute of Health and Clinical Excellence (NICE, 2008).

OSA can only be improved if these devices are used for four to five hours each night, which is rarely achieved by all individuals, even though the machines have become quieter and smaller, and the masks have also been improved.

Some cases of mild to moderate OSA can be treated by making lifestyle changes. These include:

- Losing weight;
- Avoiding alcohol during the evening;
- Stopping smoking;
- Avoiding the use of sleeping tablets and tranquillisers;
- Not sleeping on the back because this can make snoring worse.

Adjustable mandibular splints can also be fitted.

**Conclusion**

Awareness of OSA and its links with type 2 diabetes in general practice is still poor. Due to the rise in all types of diabetes, the prevalence of OSA is likely to rise. It is vital to raise the awareness of this connection to ensure people with diabetes are treated holistically, not just for separate symptoms such as tiredness, dyspepsia and erectile dysfunction. The collection of symptoms could be an indication of OSA.

It is important to be able to identify referral pathways to ensure people with OSA access the right care. Successful treatment of OSA can improve other aspects of health, such as blood glucose levels, arrhythmias, dyspepsia, tiredness and erectile dysfunction. Left untreated, they increase the cost to both the individual and the NHS.

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**References**

Driver and Vehicle Licensing Authority (2011) Tiredness Can Kill – Advice for Drivers. Swansea: DVLA.


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**BOX 1. CLINICAL IMPACT OF OSA**

**Neurocognitive function**
- Sleepiness
- Mood changes, for example, depression

**Cardiovascular complications**
- Systemic and pulmonary hypertension
- Cor pulmonale
- Arrhythmias
- Myocardial infarction
- Stroke

**Other associated problems**
- Headache
- Heartburn
- Sexual dysfunction
- Reduced quality of life


**BOX 2. RISK FACTORS**

- Observed cessation of breathing (by a partner)
- Neck circumference
- Shirt collar size (≥17 inches in men; ≥16 inches in women)
- Smoking and alcohol
- Hypertension, atrial fibrillation, poor diabetes control, impotence, reflux, headache

All of the above could be seen in someone with type 2 diabetes

Source: Hicks (2010)