

# Why is exercise important to dentistry?



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**D**ental professionals are aware of the importance of encouraging behavioural change in patients to better individuals' oral health and general health. We advise patients to floss before brushing, use a fluoride-containing toothpaste and improve their diet. These are all extremely important; however, we tend to miss out exercise, or we mention it but without much emphasis

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on its positive impacts. Frequent exercise has a positive impact on our health which in turn has a positive impact on our oral health. This applies not only to patients but also to ourselves as part of the dental team. This article will look at the reasons why exercising can be helpful in dentistry.

## Exercise and its anti-inflammatory effects

Regular exercise is said to induce anti-inflammatory properties which are useful for the body. As we know, many health conditions such as cardiovascular disease, type 2 diabetes and depression are linked to oral health. B. K. Pedersen *et al.*<sup>1</sup> described these chronic conditions under a term 'a disease of physical inactivity' which stems from the elevated levels

of pro-inflammatory cytokines in circulation.

During non-strenuous exercise, IL-6 is one of the first cytokines produced; they are released from muscle fibres by the 'TNF-independent pathway'.<sup>2,3,4</sup> Although IL-6 seems to have great metabolic effects on the body such as inducing lipolysis, fat oxidation and glucose homeostasis, they can have negative impacts on the body as well. IL-6 was first known as a pro-inflammatory cytokine due to its presence at the early stages of an infection. However, some studies have shown its anti-inflammatory effects such as inhibition of TNF- $\alpha$  and IL-1. Hennigar *et al.*<sup>5</sup> stated that exercising excessively without sufficient rest in between, and a lack of nutrition in one's diet, can raise the immune-cell-derived IL-6 required for repair of damaged tissue but its constant high levels can adversely affect muscle function.

IL-6 can induce an increase in the circulating levels of IL-10 and IL-1ra for example, which have anti-inflammatory effects in the body.<sup>4</sup> IL-10 specifically can inhibit the formation of many pro-inflammatory cytokines such as TNF- $\alpha$ , IL-1 $\alpha$  and IL-1 $\beta$  plus inhibits many chemokines such as IL-8. All the inflammatory



cytokines and chemokines mentioned are important in the process of inflammation, hence inhibiting its action will help to provide an anti-inflammatory effect. To sum up, the anti-inflammatory effects achieved by exercising can help in easing the severity of certain chronic conditions which can then have a positive effect on general and dental health.

### Exercise and diabetes

As previously mentioned, chronic conditions such as type 2 diabetes are linked to oral health. Inflammation, which is common to both, can be reduced by exercise.

Although IL-6 is a marker of diabetes it is TNF- $\alpha$  that seems to drive the insulin resistance and affect metabolic function.<sup>4,6</sup> Thus, the more frequently one exercises in moderation, with the help of the anti-inflammatory effects, the greater the suppression of 'TNF- $\alpha$ -induced insulin resistance'. A study by Carey *et al.*<sup>7</sup> has shown that IL-6 which can be released following exercise may enhance insulin sensitivity and action. A study by Pedersen *et al.*<sup>8</sup> discovered that TNF- $\alpha$  cytokine, as well as IL-6, are partly formed from adipose tissue and TNF- $\alpha$  especially could be what drives the metabolic syndrome. It is possible that if the truncal fat, the build-up of visceral fat which is common in type 2 diabetes, can be reduced through exercise, this can have a good effect on the metabolic syndrome, positively impacting diabetes.

There is a clear dental relevance due to the bi-directional relationship between diabetes and periodontal health. In terms of the effect of diabetes on periodontitis, when a patient has a low diabetic control there will be an increase in blood glucose levels and an increase in immunoreactivity of Advanced Glycation Endproducts (AGEs) in the gingiva.<sup>9,10</sup> This can increase inflammatory cytokines such as TNF- $\alpha$  and IL-1, leading to further damage to the periodontal tissues; AGEs can also be used as a form of energy by anaerobic bacteria deep in the pockets and further the progression of the disease. This periodontal damage in turn can affect glycaemic control negatively since there is a higher chance of infection and insulin resistance. So, if exercise has been shown to reduce the inflammation that plays a key role in the link between periodontal damage and diabetes, this is a reason why adopting lifestyle changes, by adding exercise in daily routines, will be greatly beneficial for diabetic patients.

### Exercise and bone health

Generally, as individuals get older, they tend to live a more sedentary life, which could lead to a downfall in bone health. When taking part

in weight-bearing exercises such as dancing or walking, bone remodelling through the activation of osteocyte signalling, known as 'mechanotransduction', can take place.<sup>11</sup> Osteocytes are known to be the mechanosensors of the bone and need loading to survive.<sup>11</sup> This was demonstrated in the experiments by Tatsumi *et al.*<sup>12</sup> where they injected diphtheria toxin (DT) into some mice and 70-80% of the osteocytes were killed. These transgenic mice had altered bone metabolism giving them a more fragile, porous bone. They were also resistant to bone loss in their unloaded limbs which showed that osteocytes are important in mechanotransduction and require loading to enable the osteoclastic activity to start the remodelling process. This can help to keep bones healthier and stronger with a better microstructure and less adipose tissue deposition.

showing the impact of exercise on it. It has been advised that exercising frequently but in moderation is best. A study by Paolucci *et al.*<sup>15</sup> demonstrated that this helped reduce participants' levels of depression, anxiety and perceived stress compared to the control group and those who did high-intensity exercise. Moderate exercising also showed lower levels of TNF- $\alpha$ ; this in turn helps with one's mental health. Furthermore, another study by Blumenthal *et al.*<sup>16</sup> showed that exercise positively impacted patients with the major depressive disorder compared to a placebo group when comparing their HAM-D scores (Hamilton Depression Rating Scale).<sup>17</sup> Exercise can help to reduce stress which is a contributing factor in bruxism patients. However, there is still insufficient evidence on the use of physical therapy in improving various symptoms in bruxism patients; Amorim *et al.* published their

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Many patients will have issues linked to bone such as periodontitis, osteoporosis, osteopetrosis and rheumatoid arthritis (RA). As we know, exercise helps to reduce inflammation and RA for example is characterised by inflammation, pain in the joints, bone resorption and even rheumatoid cachexia. Noreau *et al.*<sup>13</sup> explained that doing aerobic exercises such as dancing helped to prevent the deterioration of RA in patients as there were no significant changes in the joint status but the number of participants who had joint pains in the exercise group decreased. RA can negatively impact the progression and occurrence of cardiovascular disease which is important to note as exercise has a positive impact on the heart.<sup>14</sup>

So in general, it is important to be aware of how aerobic moderate exercise can affect bone health positively. We all know that the dentition is usually surrounded by bone and so it is important to be aware of how certain conditions could affect our method of treatment.

### Exercise and mental health

Mental health is a huge factor in every individual and there have been many studies

data on the effectiveness of physical therapy such as massages, stretches and relaxation therapies on bruxism patients.<sup>18</sup>

An individual's mental health could hinder them from talking to dental professionals or giving their opinions; they may have more dental anxiety or be less compliant to treatment; this could have an effect on the patient-operator rapport. Exercising can aid in behavioural change; exercise could make an individual be more organised, disciplined and eager to take care of their health. Hence, they could be more compliant to bettering their oral hygiene and be more punctual, making the patient-operator relationship stronger.

It must also be noted that for members of the dental team, improving one's mental health by taking regular exercise can help improve overall teamwork and efficiency and build rapport among colleagues; this is crucial to effective team working.

### General advice for patients on exercise

In reality, we are also a patient for someone else, so not only do the suggestions in this article

**Table 1** Considerations to bear in mind regarding exercise advice given in dental settings

If diabetic, patients should exercise in moderation as some types of exercise can raise individuals' blood glucose. It is best to check blood glucose levels before and after exercise which will help to plan meals and when to take insulin.

Do not exercise after a tooth extraction. Strenuous exercising can affect the healing of the wound. The socket must clot to aid healing but exercising such as heavy lifting can increase the blood pressure so the clot is unable to form or can be dislodged; this could progress to a dry socket known as alveolar osteitis.

Strenuous exercise is not advised in the elderly as their bones are more likely to fracture, so it is imperative to advocate gentle moderate exercise such as walking or swimming, or sports like recreational tennis.

regarding exercise apply to us as dentists, dental nurses or dental hygienists but they also apply to us as patients. Mental health is a huge issue and although exercise cannot cure mental health problems, it can help. According to Iversen *et al.*,<sup>19</sup> RA patients were more likely to engage in exercise if their practitioner does aerobic exercise themselves. So, in dental aspects, it is important to practise what you preach. You are a role model for patients and setting a good example by keeping yourself healthy with regular exercise can instil good habits in your patients. Exercise has many benefits to all members of the dental team, with back pain and eye strain unfortunately being common in this field of work. As mentioned previously, exercise can help with general health, mental health and can certainly improve group dynamics.

With the current circumstances during the COVID-19 pandemic, for some the lifestyle change has involved sitting in front of their screens at home for long periods and having less of a drive to take up exercise, whereas others have seized this opportunity to take up physical exercise. In general, when talking to patients who do not exercise regularly, it is important to note that they may not understand how exercise can benefit them; it is important to help patients understand the difference exercise can make.

Ensure you can find time to have a chat with patients about their daily life and help them to find a way to add exercise into their daily routines, if they have not, using SMART goals. This could be by joining a local club or taking walks with family and friends - to make it more fun and achievable. Even as part of a dental team, you could organise walks or opportunities to exercise together.

In conclusion, these are a few ways in which exercise can positively impact dentistry and now more than ever it is important to take care of our health and the health of our patients.

Exercise can seem like a chore to many so it will be helpful if together, we can find ways to make it more enjoyable.

Three tips to note regarding exercise are given in Table 1.

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