

VITAL

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NEWS, VIEWS & INFORMATION FOR NUTRITIONAL PROFESSIONALS

The brain-body connection: What you do for one can benefit both



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Smart slimming

Exploring potential links between obesity, iron

Insight from research examining the relationship between obesity, iron status and cognition poses intriguing questions.

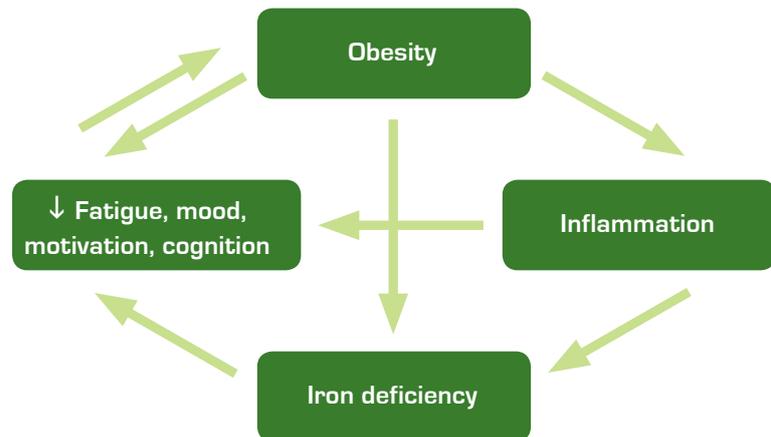
Emerging evidence continues to demonstrate that iron deficiency is more prevalent in the obese. Does this hamper attempts to comply with diet and physical activity guidelines and to consolidate the behaviour changes required for weight loss? More research is required before we know the answer, but already there are implications for everyday practice.

Obesity and iron deficiency

Emerging evidence suggests that iron deficiency is more prevalent in the obese.¹ “A number of early papers reported a higher prevalence of iron deficiency in obese individuals but these findings were largely ignored and often considered to be the result of poor dietary intake”, says Dr Helen O’Connor, Accredited practising dietitian and senior lecturer at the University of Sydney, where she is involved in the WOW study (Weight loss for Overweight Women). “There has been an upsurge in the number of studies examining iron deficiency in obese populations since 2006, including data from NHANES in both children/adolescents² and adults.³ These studies support a higher prevalence of iron deficiency in obesity”, she said. “When we were first recruiting for the WOW study in 2005, we had a disproportionate number of young women present with iron deficiency. At first our research team thought it was poor dietary intake. As our study progressed, more scientific literature on iron deficiency in obesity emerged which supported our clinical observations.”

The mechanism behind the obesity-iron deficiency link is not confirmed but there are a number of possibilities. Poor dietary intake may be a contributing factor and this is especially true for those who consume diets with low nutrient density or those following unbalanced, reduced energy diets.⁴ Obtaining sufficient iron on energy restriction is a challenge, especially for young women who have higher iron requirements to cover menstrual losses.⁵ Iron requirements may also be greater in overweight/obese individuals due to larger blood volume.¹ Probably the most significant and recent finding is that inflammation, a response associated with excess weight, reduced iron absorption from the

Fig 1. Possible relationships between obesity, inflammation, iron deficiency, fatigue, mood, motivation and cognition.



intestine and also circulation in the blood.⁶ Apparent deficiency occurs even when dietary iron intake is adequate.⁷

Cognition and iron fatigue

A commonly reported symptom of iron deficiency is fatigue. This sense of tiredness and reduced energy impacts on wellbeing and motivation. Patterson and co-workers found an association between iron deficiency and fatigue which improved after correction of iron deficiency.⁸ In the same study, mental health and vitality scores were found to be poorer in women with iron deficiency and these also improved with treatment.

Studies also demonstrate an association between iron deficiency anaemia and cognition. Most of this literature focuses on children where anaemia has been shown to delay child development, impair cognitive function and be associated with behaviour problems.⁹ Recently, cognitive impairment was also shown in a study of young adult women with iron deficiency and iron deficiency anaemia.¹⁰ Treatment with supplements led to a 5–7 fold improvement in cognitive performance. Likewise, Brunner et al¹¹ found adolescent girls with iron deficiency demonstrated cognitive impairment.

EDITORIAL COMMENT

As dietitians we are constantly thinking about how food affects the body. We think about how much to eat and when and how this affects weight, cholesterol, blood glucose and intolerances but do we ever think about how nutrition and other lifestyle factors affect the brain? There is an emerging body of evidence showing that both diet quality and exercise are beneficial for brain health and mental wellbeing. In this issue of *Vital* we introduce you to three experts with interesting insights.

Dr Helen O’Connor discusses the possible link between cognition, iron deficiency and obesity. Cognitive scientist Mimma Mason works on one of the biggest brain databases in the world and highlights some of the most influential factors affecting brain performance. With depression now affecting one in five people some time in their life, Dr Felice Jacka discusses how dietary quality is linked to anxiety and depression.

We hope you find this issue of *Vital* interesting and as always we look forward to your feedback and ideas for future issues.



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deficiency and cognition

Cognition and obesity

There is some evidence of a cognitive deficit in obese individuals with and without co-morbidities such as higher blood pressure, diabetes and cardiovascular disease which may independently impair cognition, particularly in the elderly.¹² However, a recent and large (~400 participants) study found BMI (without co-morbidities) was inversely related to cognitive performance on a standardised, well-validated cognitive test.¹³ This has also been shown in another study in Korean adults¹⁴ but additional research is required to confirm the association. Interestingly, a link between inflammation and cognition has also been proposed.^{15, 16, 17} It is possible that iron deficiency, secondary to inflammation mediates at least some of this proposed cognitive impairment but confirmation of this will require careful research in coming years.

A vicious cycle

"Our research group plans to explore these possible links between cognition, mood, fatigue, iron deficiency and obesity (Fig 1). Weight management requires substantial effort from the patient; it is not a passive affair. Energy and motivation are essential elements", says Dr O'Connor. The changes patients need to be successful in managing weight are significant and include regular, ideally daily exercise, shopping and preparing healthy meals. Iron deficiency may compromise energy levels, motivation and mood and make weight management more challenging. Ultimately this may decrease weight loss success.

Complicating the management of iron deficiency in obesity is whether iron supplements used to correct the deficiency are as effective in obese people. "We found reversing the iron deficiency of some young women in our trial challenging – they did not respond as well to supplementation as expected", said Dr O'Connor. "Compliance with iron supplements can be a problem but we suspect that they may be less effective in treating iron deficiency in obese persons, similar to clinical findings in other inflammatory conditions", she said. "Likely this is due to reduced iron absorption and abnormal iron circulation in response to inflammation."

Clearly more research is needed. In the meantime, it may be prudent to consider iron deficiency as a potential risk in overweight/obese individuals and incorporate strategies for both weight loss and iron intake optimisation.

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EXPERT COMMENT

Dr Helen O'Connor

Accredited practising dietitian and senior lecturer in the Discipline of Exercise and Sport Science at the University of Sydney

"Certainly I think it's worth considering an iron status check* and talking to obese patients about energy levels. Fatigue is commonly reported by obese patients presenting for weight loss therapy and iron deficiency may be a contributing factor. This would especially be the case for women who have higher iron requirements, particularly those with polycystic ovarian syndrome (PCOS) which is more common in overweight or

obese women. Menorrhagia or heavy menstrual loss can be higher in women with PCOS."

"Our experience with diet modelling is that iron is the hardest nutrient to meet on an energy-restricted diet. Careful planning is required to ensure the diet provides sufficient iron and strategies are in place to optimise bio-availability."



Dr Helen O'Connor

* Serum ferritin is not a reliable marker of iron status in obesity as it is an acute phase reactant and elevated by inflammation. Measurement of serum transferrin receptor is recommended in addition to markers which assess inflammation (e.g. c-reactive protein and α -1 glycoprotein).

Diet and depression

A poor diet is a risk factor for a number of different physical diseases. Now a growing body of evidence suggests it is also a risk for mental illness, and that a good diet is protective against depression and anxiety.

A healthy diet characterised by vegetables, lean red meat, fish and wholegrains may help prevent depression and anxiety. This is the finding of new research by Felice Jacka et al¹, at the University of Melbourne, and though it's what Jacka expected to find, she says no one else did.

"Psychiatry is traditionally informed by the paradigm of a mind-body dichotomy", she explains. "In many ways psychiatry is about a decade behind the rest of medicine in looking at the role that diet plays in illness."

Jacka has had a strong interest in nutrition and says she recognised that the biological processes that affect depression are modified by diet. Her research analysed the diets of 1046 women enrolled in the Geelong Osteoporosis Study and, using the Cancer Council Victoria's dietary questionnaire, a factor analysis identified the diets of women according to three patterns:

Traditional: characterised by consumption of vegetables, fruit, beef, lamb, fish and wholegrain foods

Western: characterised by consumption of meat pies, processed meats, pizza, chips, hamburgers, white bread, sugar, flavoured milk drinks and beer

Modern: characterised by consumption of fruits and salads plus fish, tofu, beans, nuts, yoghurt, and red wine

As well, a diet-quality score was derived from the dietary questionnaire, based on Australian National Guidelines for Healthy Eating. A point was assigned for meeting the recommendations. For example, a point was assigned for the consumption of at least four serves of vegetables a day and for red meat consumption one to five times a week.

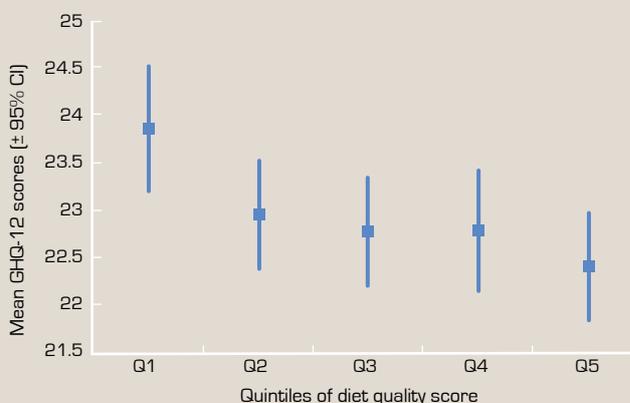
Better diet, better mental health

The traditional diet was associated with a lower likelihood of depression and anxiety, the western pattern was the highest. There was also a dose-response pattern seen with the diet-quality scores. The higher the diet-quality score, the lower the score of psychological symptoms on the General Health Questionnaire (GHQ-12).

Given the incidence of mental illness in the western world, particularly anxiety and depression, Jacka sees a big role for

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Figure 11: Mean GHQ-12 scores (95% confidence intervals) across quintiles of diet quality score.



P for trend <0.001 - Significant trends in association between diet quality scores and mean GHQ-12 scores were evident.

preventative measures such as exercise and diet. "The emphasis in the psychiatric literature is on treatment, but depression is a chronic illness; once you have had one episode, you are more likely to have another one, and the risk continues to increase. I think looking only at treatment is shutting the gate after the horse has bolted."

The other problems with current treatment options for depression is that success is limited. "Psychotherapy works for some people and medication works for people with severe illness", says Jacka. "In the last two years there has been a burgeoning interest in the effect of exercise on depression, and it is very effective. In the research I've done, I've looked at the degree to which diet quality explains symptoms of depression in the community, and when compared to exercise, I found they are roughly similar and independent. So potentially diet could be just as effective as exercise in treating anxiety and depression."



Felice Jacka

Jacka is hoping to do a follow-up study testing a dietary intervention to treat depression.

MORE ON DIET AND DEPRESSION

Two other studies have looked at the impact of dietary patterns on depression:

- > Akbaraly et al² found that a 'processed food' pattern featuring a high consumption of sweetened desserts, chocolates, fried foods, processed meats, refined grains, high fat dairy and condiments increased risk of depression, while a 'whole' food pattern, identified by a high intake of vegetables, fruits and fish was protective against depression.
- > Sanchez-Villegas et al³ assessed the association between adherence to the Mediterranean diet pattern and the incidence of clinical depression and found a protective role for the diet.

It is interesting that like the Australian study, the more traditional dietary patterns characterised by whole foods seemed to be more protective than more recent dietary patterns such as the western diet and the modern diet.

Exercise, rest and the brain

Understanding the brain and how to optimise its performance offers clues for successfully making the change to healthy-eating behaviours.

Physical activity and quality sleep impact directly on health. A lack of both play a crucial role in the accumulation of excess weight. Now research on brain health is showing that physical activity and rest and recovery also play vital roles in promoting optimal mental wellbeing, impacting on potential weight loss success.

Access to these important insights is made easier through the creation of the Brain Resource International Database. This is a comprehensive, integrated and standardised database of brain health, which so far holds data from more than 500 scientific studies. Evidence from the database shows the role that physical activity and recovery plays in brain health.

Physical activity and brain health

New research on exercise and the brain continues to find evidence that exercise improves brain function. “Our bodies were meant to move”, says Mimma Mason, cognitive scientist at Brain Resource. “We are not just bodies from the neck down. Exercise plays an important role in brain health by restoring the balance of neurotransmitters in the brain.”

These neurotransmitters regulate brain function, affecting the way we think, feel and learn. Exercise increases release of Dopamine for instance, affecting the balance of the reward system in the brain over time. Exercise has been shown to boost mood and improve attention and decision-making.¹ The outcome of this is better self-regulation. Research has shown that exercise improves self-regulation and that people who increase their exercise levels have better control over a wide range of behaviours, from eating junk food to caffeine and tobacco consumption, over-spending, loss of temper and even procrastination.^{2,3}

“For whatever addictive behaviour you are trying to treat, exercise is good medicine”, says Mimma Mason. “The brain environment that exercise creates allows for better decisions, and less impulsive

IMPLICATIONS FOR PRACTICE

“The more you look after your brain, the more your brain can look after you,” says Mason. She recommends these three everyday tips for better brain function:

1. Exercise your body everyday, to generate new brain cell connections and boost self-regulation.
2. Take regular two-minute breaks throughout the day to practice 4,3,7 breathing – breathe in to the count of four, hold your breath for the count of three and breath out for the count of seven.
3. Sleep well by decreasing brain stimulation by switching off from television, computer, work or food for at least 30 minutes before bed.



behaviour. We need to remember that behaviour is brain-based. That also means you can change it successfully with both physical and mental training.”

People trying to lose weight have always been encouraged to be active to increase their energy expenditure, but this new research gives added impetus to recommendations that combine dietary change with increased exercise. It shows that exercise can play a double role, reducing the risk of out-of-control, non-hungry eating through enabling better self-regulation, and increasing weight loss through boosts to metabolism and energy expenditure.”

Recovery and brain health

Good rest and recovery practices can also boost cognitive performance. Some of the most interesting research on rest and recovery comes from the US Army Department of Behaviour Biology at the Walter Reed Army Institute in Washington, says Mason. “They are concerned with reducing human error on all levels of performance. They found that we cycle through 90-minute rhythms throughout the day and night with predictable dips in performance as our body automatically manages our need for rest.” The army researchers found that by letting people have appropriate rest – scheduling breaks every hour and half – they were able to reduce errors, accidents and stress-related disorders.⁴

You don’t need a long break, says Mason, to allow recovery and boost cognitive performance. “Just two minutes of getting up, having a stretch, a few deep breaths, a quick chat – It’s like pressing the reset button. You will feel refreshed, and ready to get back into the next phase. Strategies such as these are particularly useful at critical times like the mid afternoon slump which will help you to avoid eating foods like sweets and chocolate that can frustrate weight loss attempts”.



Mimma Mason

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Cooking skills

The Last Night's Dinner survey found lamb roast is one of the top 10 most popular meals served in the home. However, roasts are often perceived as a special occasion meal which is more likely to be served on Sundays¹ when we have more time. While it does take a little more time to cook, once the roast is in the oven, it takes care of itself. There are many different beef and lamb roasting cuts to choose from depending on your preference, occasion and budget. In addition to being a nutritious family meal, roasts are also great for leftovers in salads and sandwiches for lunch the next day.

Everyday cuts

BEEF



Eye round



Topside



Blade

LAMB



Leg (easy carve)

Special occasion cuts

BEEF



Standing rib roast

LAMB



Mini roast
(round/knuckle)



Rack

ROAST RECIPES

For an easy-to-prepare lunch, combine your leftover beef or lamb roast, salad greens and a little salad dressing.

Beef or lamb roast salad tips

- Slice the roast thinly so the meat is easily coated with the dressing.
- Add the dressing to the salad just before serving to help keep the flavours of the meat, the salad and the dressing fresh and flavoursome.

To receive your free recipe journal come and visit the MLA Nutrition stand at the DAA conference in Melbourne (journal only available at the conference). We look forward to seeing you there.

Thai style char-grilled beef salad

Preparation time: 10 minutes

Cooking time: 6 minutes

Serves: 4

Leftover roast beef

- 1 small continental cucumber, sliced
- 150g green beans, trimmed and blanched
- 250g cherry tomatoes, halved
- ½ red onion, sliced
- ¼ cup sweet chilli sauce
- Juice of 2 limes
- 2 tsp soy sauce



For more delicious roast beef recipes see your copy of *Entice* or visit enticemagazine.com.au

COVER RECIPE

Lamb roast and vegies

Preparation time: 10 minutes

Cooking time: 60 minutes

Serves: 6

- 1 kg leg lamb, trimmed
- 1 tbsp olive oil
- 2 cloves garlic, crushed
- Grated rind and juice 1 lemon and 1 orange
- 2 tbsp rosemary leaves
- Potato and sweet potato, cut into chunks
- 8–10 Brussels sprouts, shredded
- 1 cup frozen peas
- 2 sprigs mint, leaves shredded

- Marinate lamb with oil, garlic, rind, juices and rosemary. Preheat oven to 180°C.
- Drain lamb from marinade, place in roasting dish. Reserve marinade. Roast for 50 mins for rare, 60 mins for medium, or 70 mins for well done.
- Baste twice with marinade during cooking. Add potato and sweet potato to the roasting dish in the last 30 mins cooking time (brush lightly with oil).
- Remove lamb, cover and rest it for 15 mins. Cook sprouts in a non-stick frypan until just soft, add peas and mint, cook 1 min more. Serve lamb slices, drizzle with pan juices and vegetables.

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1. Meat & Livestock Australia (2009). *Last night's dinner report: What Australians prepared for dinner last night.*