

Nutrition and Chronic Pain

Globally, poor dietary intake is the leading cause of mortality and the top modifiable risk factor for morbidity [6]. Chronic pain is associated with elevated weight status, risk of multi-morbidity, suboptimal dietary patterns and diet quality [2; 5]. Figure 1 summarises the relationship between nutrition and aspects of chronic pain management.

Optimising dietary intake effects chronic pain [6; 9; 10]:

1. Dietary intake can enhance the function of the nervous, immune and endocrine systems, directly impacting pain experiences.
2. Losing or maintaining weight reduces the load on joints, and reduces meta-inflammation.
3. Dietary intake and weight status impacts on the risk and/or severity of other chronic diseases (e.g. cardiovascular disease, diabetes and poor mental health, including anxiety and depression), often occurring concurrently with chronic pain.

The information presented is supported by a systematic review of 73 studies which investigated the impact of a variety of nutrition interventions on self-reported pain severity in adults with chronic pain [3]. Findings, when synthesised into a meta-analysis, indicated that nutrition interventions have a significant effect on pain reduction [3].

Sub-optimal dietary intake can be the result of a number factors [1] which need to be addressed:

- Limited/reduced mobility and functional strength can affect a person's ability to shop, cook and prepare meals.
- Mental health co-morbidities and feelings of isolation (common in chronic pain) can lead to intakes of low dietary quality with increased comfort eating and/or lack of meaning around meal times.
- Lack of sleep leading to irregular eating habits.

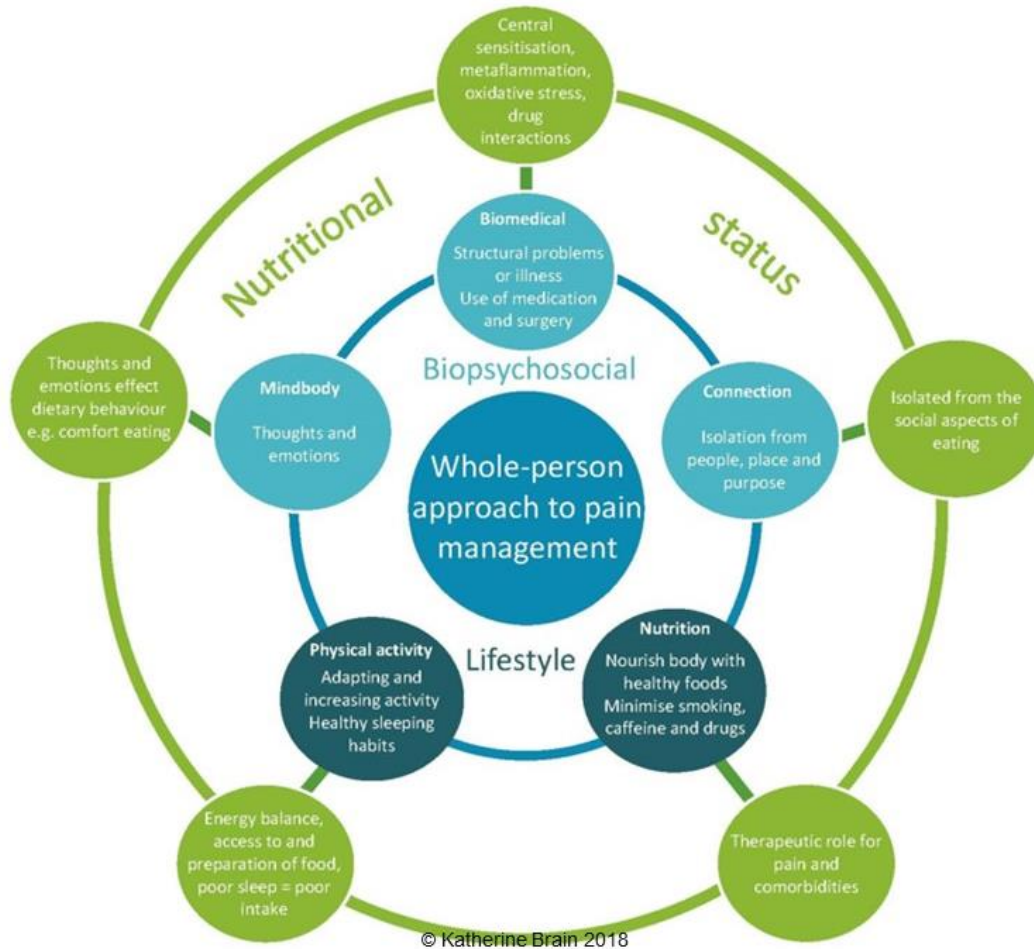


Figure 1: The relationship between nutrition and the whole-person approach to pain management

Tips for nutrition & pain management

1. Reduce inflammation to help protect your body from oxidant damage: Polyphenols are compounds found in fruit and vegetables [7]. Polyphenols have antioxidant and anti-inflammatory properties [17]. It may be difficult to include a wide range of fresh and colourful fruit and vegetables due to potential exacerbation of pain through preparation and cooking.

Practical advice for patients: Include variety by using frozen mixed vegetables which can be easily incorporated into a stir fry or casserole. They are easy and quick to use and can be stored for long periods reducing the need to go to the shops. Frozen fruits and vegetables are also a healthy option as they maintain their nutritional quality. Try a different type of fruit each week and include frozen fruits (e.g. berries). Reduced-salt canned vegetables (e.g. tomatoes and lentils) can also be incorporated into dishes like stews and pasta dishes. At every main meal, you should aim for half of your plate to be covered in vegetables and try and include vegetables as a snack.

2. Good quality fats: Omega-3 fats and olive oil both help to reduce inflammation and enhance the immune system [14].

Practical advice for patients: Include oily fish (e.g. salmon and sardines), flax seed oil or canola oil, linseed and walnuts to boost Omega-3 intake. Aim for a minimum of 2-3 serves of oily fish per week. Extra virgin olive oil can be used for cooking from stir-frying to roasting and can be used to make salad dressings. Reduce saturated and trans fats such as butter, processed and take away foods and hydrogenated vegetable oils and limit polyunsaturated fats such as sunflower and safflower oils

Fish oil supplements: There is a wide range of fish oil supplements. Seek advice from a dietitian or medical professional before taking high doses of fish oil supplements. Evidence suggests that 3000mg of omega 3 over a 3-month period helps to reduce pain, especially in rheumatoid arthritis [14]. Fish oil supplements contain a combination of EPA and DHA (two types of omega 3). It is important to ensure that the ratio of EPA/DHA is ≥ 1.5 . If you take fish oil supplements aim for a good quality brand which contains a high dose of omega 3.

3. Prevent vitamin and mineral deficiencies: Common micronutrient deficiencies in people experiencing pain include Vitamin D, Vitamin B12 and magnesium. Vitamin D, which comes primarily from exposure to sunlight, is an antioxidant and associated with muscle fatigue [15]. Vitamin B12 plays a role in neurological processes related with pain [4]. Magnesium is associated with muscle spasm, inflammation and neuropathic pain [8]. Deficiencies in micronutrients may exacerbate pain.

Practical advice for patients: Consume a wide range of nutrient-dense foods to ensure you are meeting your vitamin and mineral requirements. For example meat, fish and dairy are good sources of Vitamin B12, fish and eggs for Vitamin D and green leafy vegetables and wholegrains are high in magnesium. Vitamin D can also be obtained from sun-exposure. For most people 10-15 minutes of sun on the arms and legs most days of the week will provide most of your Vitamin D requirements. However, this will vary based on a number of factors such as location and time of year.

Practical advice for clinicians: Dietitians should regularly assess the dietary intake of people experiencing pain so that deficiencies are identified early and addressed through changes to dietary intake. In some circumstances, a supplement may be recommended. Seek advice from a dietitian or medical professional.

4. Water intake: Dehydration can increase sensitivity to pain. It can also have other effects on health outcomes, especially in older populations, such as poor wound healing and constipation [13]. Water is essential for circulation of nutrients and waste elimination both of which can influence healing, and pain. Thirst is often mistaken for hunger and if people drink enough water they may find that they consume less food.

Practical advice for patients Aim for 2-3 litres/day by incorporating small frequent drinks between meals and foods with higher water content e.g. soup, fruit and reduced fat yoghurt. Fill a large water bottle every day and work through it to ensure fluid goals are met.

5. Increase fibre: Fibre is important for proper digestion and maintenance of a healthy microbiome and weight management. When increasing fibre intake, it is important to increase fluid intake as well. Fibre and fluid work together in promoting bowel health [11].

Practical advice for patients: Adult females should consume 25g/day and adult males 30g/day. Switch to wholemeal/wholegrain breads (2 slices=6g), pastas (1 cup=10g), breakfast cereals (3/4 cup=4.5g), psyllium (1 tablespoon=2g), bran (1 tablespoon=2g), mixed vegetables (1/2 cup=4g), fruit with the skin on (1 apple=2g) and 4 bean mix (1/2 cup=6g). Fibre supplements may be recommended.

6. Reduce and limit ultra-processed foods and sugar intake: These foods and drinks contain high amounts of energy and very low (or no) amounts of beneficial nutrients [12]. These foods can increase inflammation and oxidation which can worsen pain experiences. Higher intakes of these foods and drinks lead to a higher risk of poor health and chronic diseases such as cardiovascular disease and diabetes [12; 16].

Practical advice for patients: Swap sugary drinks for water or unflavoured mineral water and choose healthy convenient snack options such as fruit, vegetable sticks or reduced fat yoghurt. Instead of take away foods, try cooking at home more often. This can be just as easy and quick as buying take away foods.

REFERENCES

- [1] Agency for Clinical Innovation. Pain: Lifestyle and Nutrition [Internet], 2018.
- [2] Brain K, Burrows T, Rollo ME, Hayes C, Hodson FJ, Collins CE. Population characteristics in a tertiary pain service cohort experiencing chronic non-cancer pain: Weight status, comorbidities, and patient goals. *Healthcare (Basel)* 2017;5(2).
- [3] Brain K, Burrows TL, Rollo ME, Chai LK, Clarke ED, Hayes C, Hodson FJ, Collins CE. A systematic review and meta-analysis of nutrition interventions for chronic noncancer pain. *J Hum Nutr Diet* 2019;32(2):198-225.
- [4] Buesing S, Costa M, Schilling JM, Moeller-Bertram T. Vitamin B12 as a Treatment for Pain. *Pain physician* 2019;22(1):E45-e52.
- [5] Collins CE, Burrows TL, Rollo ME, Boggess MM, Watson JF, Guest M, Duncanson K, Pezdirc K, Hutchesson MJ. The comparative validity and reproducibility of a diet quality index for adults: the Australian Recommended Food Score. *Nutrients* 2015;7(2):785-798.
- [6] GBD Collaborators. Health effects of dietary risks in 195 countries, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*.
- [7] Manach C, Scalbert A, Morand C, Rémésy C, Jiménez L. Polyphenols: food sources and bioavailability. *Am J Clin Nutr* 2004;79(5):727-747.
- [8] Na HS, Ryu JH, SH D. The role of magnesium in pain. In: Vink R, N M, editors. *Magnesium in the Central Nervous System* [Internet]. Adelaide: University of Adelaide Press, 2011.
- [9] Naylor R, Hayes C, Egger G. The relationship between lifestyle, metaflammation, and chronic pain: a systematic review. *Am J Lifestyle Med* 2013;7(2):130-137.
- [10] Okifuji A, Hare BD. The association between chronic pain and obesity. *J Pain Res* 2015;8:399-408.
- [11] Rauck RL, Hong K-sJ, North J. Opioid-Induced Constipation Survey in Patients with Chronic Noncancer Pain. *Pain Practice* 2017;17(3):329-335.
- [12] Rico-Campà A, Martínez-González MA, Alvarez-Alvarez I, Mendonça RdD, de la Fuente-Arrillaga C, Gómez-Donoso C, Bes-Rastrollo M. Association between consumption of ultra-processed foods and all cause mortality: SUN prospective cohort study. 2019;365:l1949.
- [13] Schumacher T, Burrows LT, Rollo ME, Collins C. Pain and nutrition. In: Gouke, editor. *Pain in Residential Aged Care Facilities: Management Strategies*, 2nd Edition: Australian Pain Society, 2018. pp. 125-134.
- [14] Senftleber NK, Nielsen SM, Andersen JR, Bliddal H, Tarp S, Lauritzen L, Furst DE, Suarez-Almazor ME, Lyddiatt A, Christensen R. Marine Oil Supplements for Arthritis Pain: A Systematic Review and Meta-Analysis of Randomized Trials. *Nutrients* 2017;9(1):42.
- [15] Shipton EA, Shipton EE. Vitamin D and Pain: Vitamin D and Its Role in the Aetiology and Maintenance of Chronic Pain States and Associated Comorbidities. *Pain research and treatment* 2015;2015:904967.
- [16] Srouf B, Fezeu LK, Kesse-Guyot E, Allès B, Méjean C, Andrianasolo RM, Chazelas E, Deschasaux M, Hercberg S, Galan P, Monteiro CA, Julia C, Touvier M. Ultra-processed food intake and risk of cardiovascular disease: prospective cohort study (NutriNet-Santé). 2019;365:l1451.

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[17] Zhang H, Tsao R. Dietary polyphenols, oxidative stress and antioxidant and anti-inflammatory effects. *Current Opinion in Food Science* 2016;8.

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