Nutrition & Natural Ingredients for Pain Management

MANDY MAN, ACCREDITED PRACTISING DIETITIAN (AUSTRALIA)

28 MARCH 2025

Outline

- Eating behaviours and pain
- Nutrients and pain
  - Vitamin B12
  - Omega 3 fatty acids
- Dietary interventions for pain

Background

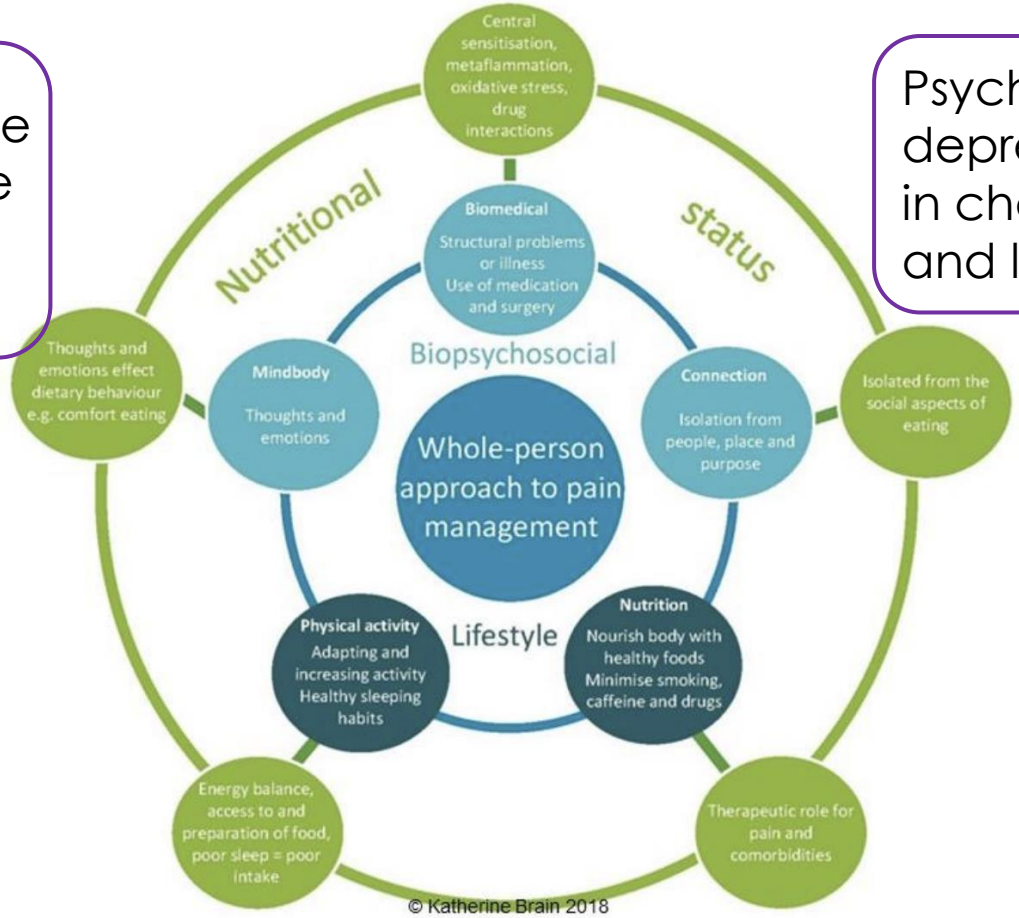
- Chronic pain is pain that persists or recurs for more than 3 months.
- It affects approximately 20% of adults worldwide.
- Evidence-based treatment for chronic pain incorporates the biopsychosocial approach – addressing the interplay of biomedical, psychological & social factors that affect chronic pain.

Treede et al. Pain. 2019.

Nutrition & Biopsychosocial Approach to Pain Management

Pain mechanisms that can be modulated by diet: oxidative stress, inflammation, gut microbiome etc

Psychosocial stress (e.g. depression, isolation) can result in changes in eating behaviours and low diet quality



Lifestyle factors: physical activity, exercise, sleep, stress, nutrition/diet.

Brain KB et al. 2020; Dong et at. Sci Rep. 2024.

Eating Behaviours and Pain

- A registry-based study at a specialized pain rehabilitation centre in Sweden (Pain and Rehabilitation Centre, Linköping University Hospital).
- Baseline data collected prior to consultation with a physician (N=2152) between August 2016, and December 2021.
- Patients answered a lifestyle questionnaire on their eating habits and desire to modify their lifestyle.

Dong et at. Sci Rep. 2024.

	All patients, N = 2152[1]	Patients who desired to eat healthier (PD), n = 426	Patients who did not desire to eat healthier (PND), n = 1720[2]	*P*-value (*PD* vs *PND*)
Age, mean ± SD	46.1 ± 14.6	42.0 ± 14.0	47.1 ± 14.6	**< 0.001**
18–29 years	339 (15.8)	98 (23.0)	241 (14.0)	**< 0.001**
30–54 years	1222 (56.8)	250 (58.7)	966 (56.2)	
55 + years	591 (27.5)	78 (18.3)	513 (29.8)	
Female gender	1545 (71.8)	317 (74.7)	1223 (71.1)	0.174
Country of birth				0.622
Nordic country	1746 (84)	344 (84.5)	1396 (84.7)	
Other European country	85 (3.9)	65 (3.9)	20 (4.9)	
Outside Europe	231 (10.7)	43 (10.6)	188 (11.4)	
University/college	495 (23)	402 (27.0)	92 (24.7)	0.380
LiSAT- economy, satisfied	575 (29.8)	89 (23)	486 (31.6)	**0.001**
BMI, mean ± SD	27.2 ± 5.6	28.0 ± 6.4	27.0 ± 5.3	**0.004**
Underweight	40 (1.9)	10 (2.5)	29 (1.8)	**< 0.001**
Normal weight	732 (37.0)	137 (34.9)	594 (37.6)	
Overweight	673 (31.3)	109 (27.7)	563 (35.6)	
Obesity	534 (24.8)	137 (34.9)	394 (24.9)	
Pain duration, years, mean (95% CI)	9.7 (9.2–10.2)	10.4 (9.3–11.5)	9.6 (9.0–10.1)	**0.020**
≥ 5 years since pain debut	966 (52.5)	206 (58.2)	760 (51.1)	**0.016**
Pain intensity (NRS-7d), mean ± SD	7.1 ± 1.8	7.1 ± 1.7	7.1 ± 1.8	0.355
Pain regional index, mean ± SD	14.4 ± 9.0	16.5 ± 9.1	14.4 ± 9.0	**< 0.001**
HADS-A, mean ± SD	8.8 ± 5.0	9.7 ± 5.1	8.5 ± 4.9	**< 0.001**
HADS-D, mean ± SD	8.6 ± 4.7	9.0 ± 4.4	8.5 ± 4.7	**0.026**
HADS-total, mean ± SD	17.3 ± 8.7	18.6 ± 8.5	17.0 ± 8.7	**< 0.001**
Anxiety indicated by HADS-A	742 (34.5)	188 (46.4)	550 (33.9)	**< 0.001**
Depression indicated by HADS-D	680 (31.6)	153 (37.9)	525 (32.2)	**0.032**
Emotional distress indicated by HADS-total score ≥ 22	661 (32.6)	161 (39.9)	500 (30.8)	**< 0.001**

Dong et at. Sci Rep. 2024.

Findings on Eating Habits

- Common suboptimal eating habits:
  - Nearly daily consumption of confectionary (33.3%)
  - Irregular mealtimes (27.2%)
  - Weekly consumption of fast-food (20.3%)
- Patients' desire to eat healthier was associated with suboptimal eating habits:
  - Increased consumption of confectionary (OR 1.33, 95% CI 1.17–1.51)
  - Increased consumption of fast-food (OR 1.87, 95% CI 1.54–2.26).
- Negative association between good eating habits & desire for healthy eating:
  - Regular mealtimes
  - High intake of fruit and/or vegetables

Dong et at. Sci Rep. 2024.

Implications

- There is a need and want for diet modification among patients with chronic pain
- Hence, eating habits should be addressed in pain management.
- Nutritional care tailored to individual patient's needs is encouraged.

Dong et at. Sci Rep. 2024.

Nutrients and Pain

- Chronic pain has been shown to be related with pro-inflammatory states which trigger peripheral and central sensitization and resultant hyperalgesia, allodynia and spontaneous pain.
- According to World Health Organization, a diet rich in omega-3 fatty acids, whole grains, fruits and vegetables has shown anti-inflammatory effects.
- On contrary, a diet high in red meat, trans fats, saturated fats, refined starch, sugar and salt may lead to an immune imbalance towards inflammation.

Philpot U, Johnson MI. Pain Manag. 2019; Kurapatti M, Carreira D. Pain Physician. 2023.

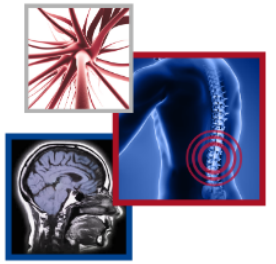
Nutrients and Pain

- Micronutrient deficiency is common in people experiencing pain: Vitamin B12, Vitamin D and magnesium.
- Low intake of micronutrients in the diet was found to be related to inflammation and pain: vitamins B1, B3, B6, B12, D and beta-carotene.
- A systematic review suggested that nutrients with antioxidant activity could improve chronic pelvic pain without undesired effects: omega-3 fatty acids, vitamin B1, vitamin B3, vitamin E and magnesium.

Editorial

Pain Management

For reprint orders, please contact: reprints@futuremedicine.com



Diet therapy in the management of chronic pain: better diet less pain?

Ursula Philpot[1] & Mark I Johnson*,[1]

[1]Centre for Pain Research, School of Clinical & Applied Sciences, Leeds Beckett University, Leeds, UK

*Author for correspondence: M.Johnson@Leedsbeckett.ac.uk

First draft submitted: 21 March 2019; Accepted for publication: 27 March 2019; Published online: 19 June 2019

Dietary therapy: a new strategy for management of chronic pelvic pain

Francesco Sesti[1]*, Talia Capozzolo[1], Adalgisa Pietropolli[1], Marco Collalti[1], Maria Rosa Bollea[2] and Emilio Piccione[1]

[1]*Endometriosis Center, Section of Gynecology and Obstetrics, Department of Surgical Sciences, Tor Vergata University Hospital, Rome, Italy*

[2]*Section of Clinical Nutrition, Department of Internal Medicine, Tor Vergata, University Hospital, Rome, Italy*

Brain KB et al. 2020; Philpot U, Johnson MI. Pain Manag. 2019; Sesti F et al. Nutrition Research Reviews. 2011.

Vitamin B12 and Pain

- Also called cobalamin
- Biologically active forms: Methylcobalamin & 5-deoxyadenosylcobalamin
- Only found in foods of animal origin and in selected fortified food products
- Functions:
  - Involved in development, myelination, and function of the central nervous system
  - Promote nerve regeneration by up-regulating gene transcription
  - May reduce ectopic nerve firing, thereby alleviating painful symptoms

Vitamin B12 and Pain

- Some evidence for the therapeutic effect of B12 in the treatment of post-herpetic neuralgia (level II evidence) and the treatment of painful peripheral neuropathy (level III evidence).
- But lack of evidence to advocate for B12 supplementation due to small study sizes, short follow-up periods and absence of placebo arms.
- Currently there are no areas in which B12 is strongly disproven.

B12 as a Treatment for Peripheral Neuropathic Pain: A Systematic Review

by Thomas Julian [1,2,*], Rubiya Syeed [1], Nicholas Glascow [3], Efthalia Angelopoulou [4] and Panagiotis Zis [5,*]

[1] Faculty of Medicine, Dentistry and Health, The University of Sheffield, Sheffield S10 2TJ, UK
[2] Sheffield Teaching Hospitals, Broomhall, Sheffield S10 2JF, UK
[3] Maritime Hospital, Gillingham, Kent ME7 5NY, UK
[4] 1st Department of Neurology, Aiginition University Hospital, National and Kapodistrian University of Athens, 115 28 Athina, Greece
[5] Medical School, University of Cyprus, Shacolas Educational Centre for Clinical Medicine, Palaios dromos Lefkosias Lemesou No.215/6 2029 Aglantzia, Nicosia 1678, Cyprus
* Authors to whom correspondence should be addressed.

Nutrients **2020**, *12*(8), 2221; https://doi.org/10.3390/nu12082221

Vitamin B12 and Pain

PAIN Practice

REVIEW | Full Access

The role of diet and non-pharmacologic supplements in the treatment of chronic neuropathic pain: A systematic review

Jennifer K. Frediani PhD, RD, ACSM-CES, Asim A. Lal MD, Esther Kim BS, Sharon L. Leslie MSLS, AHIP, David W. Boorman MS, Vinita Singh MD

First published: 31 August 2023 | https://doi.org/10.1111/papr.13291 | Citations: 1

Studies with vitamin B12, vitamin E, and glutamine had **conflicting results** regarding efficacy.

Omega-3 Fatty Acids and Pain

- Polyunsaturated fatty acids are essential fatty acids – must be obtained through diet
  - Omega-6 & omega-3 fatty acids
  - Omega-3: involved in resolution of inflammation
- Food sources of omega-3 fatty acids:
  - Plant-based (mainly alpha-linolenic acid (ALA)): flaxseed (linseed), soybean, and canola oils; chia seeds , walnuts
  - Animal-based (varied content of eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA)): cold-water fatty fish e.g. salmon, mackerel 鯖魚, tuna, herring, and sardines, and lower levels in bass, tilapia, cod and shellfish
  - Fortified foods: eggs, juices, milk, yogurt and soy drinks etc

Omega-3 Fatty Acids and Pain

- Evidence from intervention studies that omega-3 fatty acid supplementation may reduce general musculoskeletal pain, exercise-induced pain and osteoarthritic pain.
- Observational studies have found that fish consumption and omega-3 fatty acid intake are associated with a reduced risk of rheumatoid arthritis and lower odds of high pain intensity / refractory pain.

nutrients

MDPI

Review

Effects of Nutritional Interventions in the Control of Musculoskeletal Pain: An Integrative Review

Carolina Rodrigues Mendonça [1,*], Matias Noll [1,2], Maria Clara Rezende Castro [1] and Erika Aparecida Silveira [1]

1 Programa de Pós-Graduação em Ciências da Saúde, Universidade Federal de Goiás, Goiânia 74605-050, Goiás, Brazil; matias.noll@ifgoiano.edu.br (M.N.); mariaclara.recas17@gmail.com (M.C.R.C.); erikasil@terra.com.br (E.A.S.)
2 Instituto Federal Goiano, Campus Ceres, Ceres 76300-000, Goiás, Brazil
* Correspondence: carol_mendonca85@hotmail.com

Received: 6 August 2020; Accepted: 31 August 2020; Published: 9 October 2020

check for updates

Mendonça CR eta l. Nutrients. 2020;
Carballo-Casla A et al. Clin Nutr. 2022.

Omega-3 Fatty Acids and Pain

- A cohort of community-dwelling Spanish older adults (aged 60 years and older, n=2519)
- Findings:
  - Increased oily fish intake was inversely associated with pain incidence and worsening over 5 years.
  - Higher marine omega-3 fatty acid intake was related to less pain worsening.

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

ELSEVIER

CLINICAL NUTRITION

Original article

Fish consumption, omega-3 fatty acid intake, and risk of pain: the Seniors-ENRICA-1 cohort

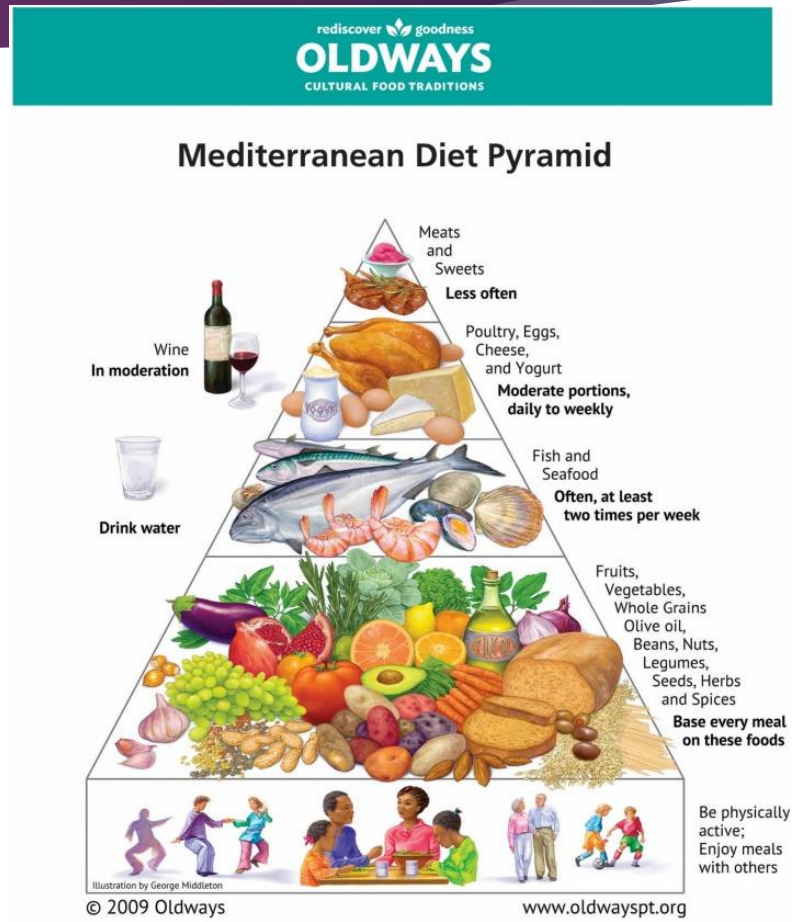
Adrián Carballo-Casla [a, b, *], Esther García-Esquinas [a, b, c], José R. Banegas [a, b], Fernando Rodríguez-Artalejo [a, b, d], Rosario Ortolá [a, b, **]

[a] Department of Preventive Medicine and Public Health, Universidad Autónoma de Madrid, Calle del Arzobispo Morcillo 4, 28029 Madrid, Spain
[b] CIBER of Epidemiology and Public Health (CIBERESP), Avenida de Monforte de Lemos 3-5, 28029 Madrid, Spain
[c] National Center of Epidemiology, Instituto de Salud Carlos III, Avenida de Monforte de Lemos 5, Hall 12, 28029 Madrid, Spain
[d] IMDEA Food Institute. CEI UAM+CSIC, Carretera de Canto Blanco 8, 28049 Madrid, Spain

Carballo-Casla A et al. Clin Nutr. 2022.

Dietary Interventions for Pain

- Mediterranean Diet may have beneficial effects on pain
  - Improve pain through it's antioxidant properties & anti-inflammatory effects
  - Reduce the risk of chronic disease associated with chronic pain e.g. DM, obesity, frailty etc.



Dietary Interventions for Pain

- A population-based study among older adults has demonstrated that a higher adherence to Mediterranean Diet was related to a subsequent improvement in pain characteristics (severity, frequency and number of sites).
- Main contributors to observed associations:
  - High consumption of fruit and vegetables
  - Low consumption of sugar-sweetened beverages

Ortolá R et al. J Gerontol A Biol Sci Med Sci. 2022 .

Food	Target amount
Olive oil	Main fat ; ≥4 tablespoons/day
White meat	Preferred over red meat
Vegetables	≥2 servings/day
Fruit	≥3 pieces/day
Legumes; Nuts; Fish or seafood	≥3 servings/week
Dish w/ traditional sauce of tomato, garlic, onion or leek sautéed in olive oil	≥2 servings/week
Wine	≥7 servings/week
Red or processed meats	<1 serving/day
Butter, margarine or cream	<1 serving/day
Sugar-sweetened beverages	<1 cup/day
Wine	≥7 servings/week

Practical Tips for Nutrition & Pain Management

1.

Food Group/Nutrient	Recommendation	Rationale	Practical Tips
Fruit and vegetables	Encourage the consumption of fruit and vegetables. Aim for a variety and wide range of bright colors.	Fruit and vegetables contain phytonutrients which reduce oxidative stress and inflammation.	Choose frozen fruits and vegetables options to reduce preparation time and effort, food waste, and increase variety. Nutrients are retained through freezing.

International Association for the Study of Pain (IASP):

- Try different types of fruit each week and include frozen fruits (e.g. berries).
- Aim for half plate of vegetables at every meal and include vegetable as snack.

Elma Ö, Brain K, Dong HJ. J Clin Med. 2022; Brain KB et al. 2020

American Heart Association.
Healthy for Good™

EAT MORE COLOR

The best way to get all of the vitamins, minerals and nutrients you need is to eat a variety of colorful fruits and veggies.
Add color to your plate each day with the five main color groups.

BLUE & PURPLE

blackberries
blueberries
black currants
dates
eggplants
grapes
plums
prunes
purple figs
raisins

RED & PINK

beets
cherries
cranberries
pink grapefruit
pomegranates
radicchio
red radishes
red apples
red grapes
red peppers
red potatoes
rhubarbs
strawberries
tomatoes
watermelons

GREEN

artichokes
asparagus
avocados
bok choy
broccoli
Brussels sprouts
celery
collard greens
cucumbers
green beans
green cabbage
green grapes
green onions
green peppers
kale
kiwis
leeks
limes
mustard greens
okra
pears
peas
romaine lettuce
snow peas
spinach
sugar snap peas
watercress
zucchini

WHITE

bananas
cauliflower
garlic
Jerusalem artichokes
mushrooms
onions
potatoes
parsnips
shallots

ORANGE & YELLOW

acorn squash
butternut squash
apricots
cantaloupes
carrots
corn
grapefruit
lemons
mangoes
nectarines
oranges
orange peppers
papayas
peaches
pineapples
pumpkins
summer squash
sweet potatoes
tangerines
yams
yellow apples
yellow peppers
yellow squash

EAT SMART **MOVE MORE** **BE WELL**

heart.org/HealthyForGood

Practical Tips for Nutrition & Pain Management

2.

Food Group/Nutrient	Recommendation	Rationale	Practical Tips
Breads, cereals, and grains	Choose wholegrain and fiber-rich options. Aim for foods with a low glycemic index. *	Provides slow but sustained energy. Fiber & prebiotics—improves gut health and feeds the gutmicrobiome which may play a role in pain and inflammation.	Swap bread, pasta, and rice for wholegrain options. Swap high GI foods for low GI options.

International Association for the Study of Pain (IASP):

- Consume a wide range of nutrient-dense foods to meet vitamin and mineral requirements e.g. wholegrains are high in magnesium.

Elma Ö, Brain K, Dong HJ. J Clin Med. 2022; Brain KB et al. 2020

Practical Tips for Nutrition & Pain Management

3.

Food Group/Nutrient	Recommendation	Rationale	Practical Tips
Meat and meat alternatives	Choose lean meats (e.g., chicken, fish, and small amounts of red meat). Prioritize oily fish, legumes, nuts, and seeds.	Contain healthy fats which reduce inflammation. Build strength to address deconditioning associated with chronic pain.	Swap processed meats for lean meats. Choose tinned fish and legumes to save time and effort with meal preparation.

International Association for the Study of Pain (IASP):

- Include oily fish (e.g. salmon and sardines), linseed and walnuts to boost Omega-3 intake.
- Aim for a minimum of 2-3 serves of oily fish per week.

Elma Ö, Brain K, Dong HJ. J Clin Med. 2022; Brain KB et al. 2020

Practical Tips for Nutrition & Pain Management

4.

Food Group/Nutrient	Recommendation	Rationale	Practical Tips
Dairy and dairy alternatives	Choose high quality dairy foods (e.g., milk, cheese, and yoghurt).	Contains protein to build strength, variety of fats, and important vitamins and minerals.	Choose reduced fat options where possible. Pre-sliced or grated cheese will reduce energy and time needed to prepare meals. Individual tubs of natural or Greek yoghurt (no added sugar) are an easy snack

International Association for the Study of Pain (IASP):

- Consume a wide range of nutrient-dense foods to meet vitamin and mineral requirements e.g. dairy is good source of vit B12 and contain vit D.

Elma Ö, Brain K, Dong HJ. J Clin Med. 2022; Brain KB et al. 2020

Practical Tips for Nutrition & Pain Management

5.

Food Group/Nutrient	Recommendation	Rationale	Practical Tips
Healthy fats and oils	Omega-3 and monounsaturated fats.	Reduces inflammation.	Swap cooking oil for olive or canola oil.

International Association for the Study of Pain (IASP):

- Include flax seed oil or canola oil to boost Omega-3 intake.
- Extra virgin olive oil can be used for cooking from stir-frying to roasting and can be used to make salad dressings.

Elma Ö, Brain K, Dong HJ. J Clin Med. 2022; Brain KB et al. 2020

Practical Tips for Nutrition & Pain Management

6.

Food Group/Nutrient	Recommendation	Rationale	Practical Tips
Drinks	Consume 2–3 L water/day. Limit caffeine.	Dehydration increases sensitivity to pain	Carry a water bottle with you and set a goal to consume it all within a set time period.

International Association for the Study of Pain (IASP):

- Incorporate small frequent drinks between meals and foods with higher water content e.g. soup, fruit and reduced fat yoghurt.

Elma Ö, Brain K, Dong HJ. J Clin Med. 2022; Brain KB et al. 2020

Practical Tips for Nutrition & Pain Management

7.

Food Group/Nutrient	Recommendation	Rationale	Practical Tips
Added sugar and ultra-processed food	Reduce and limit intake.	Increases inflammation and oxidative stress.	Swap sugar-sweetened beverages and energy drinks for mineral water. Choose healthy snack options, e.g., fruit, nuts, wholegrain crackers, and cheese or popcorn. Utilize minimally processed foods to facilitate home cooking rather than convenience/takeaway options, e.g., pre-cut vegetables, tinned fish and legumes, tomato based sauces, and microwave rice.

Elma Ö, Brain K, Dong HJ. J Clin Med. 2022; Brain KB et al. 2020

Summary

- Suboptimal eating habits have been observed among people experiencing chronic pain.
- Their desire to healthy eating was shown to be related to suboptimal eating habits.
- Current evidence for particular nutrients and diet types in pain management mostly comes from preclinical studies, observational trials or experimental studies with a lack of control groups and long-term follow-ups.
- However, it is worthwhile to address nutritional care in pain management in order to facilitate the adoption of healthy and balanced diet.

References

1. Treede RD, Rief W, Barke A, Aziz Q, Bennett MI, Benoliel R, Cohen M, Evers S, Finnerup NB, First MB, Giamberardino MA, Kaasa S, Korwisi B, Kosek E, Lavand'homme P, Nicholas M, Perrot S, Scholz J, Schug S, Smith BH, Svensson P, Vlaeyen JWS, Wang SJ. Chronic pain as a symptom or a disease: the IASP Classification of Chronic Pain for the International Classification of Diseases (ICD-11). Pain. 2019 Jan;160(1):19-27.
2. Brain KB, Burrows TL, Rollo M, Collins. The International Association of The Study of Pain (IASP). Nutrition and Chronic Pain. https://europeanpainfederation.eu/wp-content/uploads/2020/03/European-Year-2020-Nutrition-and-Chronic-Pain-Fact-Sheet.pdf (2020)
3. Dong HJ, Brain K, Olsson M, Dragioti E, Gerdle B, Ghafouri B. Eating habits and the desire to eat healthier among patients with chronic pain: a registry-based study. Sci Rep. 2024 Feb 27;14(1):4705.
4. Kurapatti M, Carreira D. Diet Composition's Effect on Chronic Musculoskeletal Pain: A Narrative Review. Pain Physician. 2023 Nov;26(7):527-534. PMID: 37976478.
5. Philpot U, Johnson MI. Diet therapy in the management of chronic pain: better diet less pain? Pain Manag. 2019 Jul;9(4):335-338.
6. Sesti F, Capozzolo T, Pietropolli A, Collalti M, Bollea MR, Piccione E. Dietary therapy: a new strategy for management of chronic pelvic pain. *Nutrition Research Reviews*. 2011;24(1):31-38.

References

7. Julian T, Syeed R, Glascow N, Angelopoulou E, Zis P. B12 as a Treatment for Peripheral Neuropathic Pain: A Systematic Review. *Nutrients*. 2020; 12(8):2221.
8. Frediani JK, Lal AA, Kim E, Leslie SL, Boorman DW, Singh V. The role of diet and non-pharmacologic supplements in the treatment of chronic neuropathic pain: A systematic review. Pain Pract. 2024 Jan;24(1):186-210.
9. Mendonça CR, Noll M, Castro MCR, Silveira EA. Effects of Nutritional Interventions in the Control of Musculoskeletal Pain: An Integrative Review. Nutrients. 2020 Oct 9;12(10):3075.
10. Carballo-Casla A, García-Esquinas E, Banegas JR, Rodríguez-Artalejo F, Ortolá R. Fish consumption, omega-3 fatty acid intake, and risk of pain: the Seniors-ENRICA-1 cohort. Clin Nutr. 2022 Nov;41(11):2587-2595.
11. Ortolá R, García-Esquinas E, Sotos-Prieto M, Struijk EA, Caballero FF, Lopez-Garcia E, Rodríguez-Artalejo F. Mediterranean Diet and Changes in Frequency, Severity, and Localization of Pain in Older Adults: The Seniors-ENRICA Cohorts. J Gerontol A Biol Sci Med Sci. 2022 Jan 7;77(1):122-130.
12. Elma Ö, Brain K, Dong HJ. The Importance of Nutrition as a Lifestyle Factor in Chronic Pain Management: A Narrative Review. J Clin Med. 2022 Oct 9;11(19):5950.

Evaluation