

Physical Activity, Nutrition, and Micronutrient Strategies for Healthy Aging in Adults
Over 50: Evidence-Based Recommendations

النشاط البدني والتغذية واستراتيجيات المغذيات الدقيقة من أجل الشيخوخة الصحية لدى
البالغين فوق سن الخمسين: توصيات قائمة على الأدلة

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Abstract :

As adults reach the age of 50, physiological changes across cardiovascular, musculoskeletal, cognitive, and metabolic systems increase the risk of functional decline and chronic disease. Evidence indicates that regular physical activity, structured breathing exercises, and a balanced diet rich in macronutrients, essential micronutrients, and adequate hydration can mitigate these age-related changes. This review summarizes evidence-based recommendations for aerobic, strength, flexibility, and breathing exercises, highlights the role of proteins, carbohydrates, fats, and hydration, and discusses critical micronutrients including antioxidants, anti-inflammatory compounds, and energy cofactors. Practical strategies for integrating these behaviors into daily life are provided, emphasizing consistency, individual tailoring, and safety. Implementing these lifestyle approaches can improve physical performance, cognitive function, and overall quality of life, supporting healthy aging and independence in adults over 50.

Keywords: Healthy aging; Physical activity; Nutrition; Micronutrients; Adults over 50; Exercise; Lifestyle interventions

الملخص :

مع بلوغ البالغين سن الخمسين، تؤدي التغيرات الفسيولوجية التي تصيب الأجهزة القلبية الوعائية، والعضلية الهيكلية، والمعرفية، والتمثيل الغذائي إلى زيادة خطر التدهور الوظيفي وظهور الأمراض المزمنة. وتشير الأدلة العلمية إلى أن ممارسة النشاط البدني بانتظام، وأداء تمارين تنفس منظمة، واتباع نظام غذائي متوازن غني بالمغذيات الكبرى، والعناصر الدقيقة الأساسية، مع الحفاظ على ترطيب كافٍ، يمكن أن يخفف من هذه التغيرات المرتبطة بالتقدم في العمر. يستعرض هذا المقال التوصيات المبنية على الأدلة العلمية فيما يخص التمارين الهوائية، وتمرينات القوة، والمرونة، وتمرينات التنفس، كما يسلط الضوء على دور البروتينات، والكربوهيدرات، والدهون، والترطيب. إضافة إلى ذلك، يناقش أهمية بعض المغذيات الدقيقة الأساسية، بما في ذلك مضادات الأكسدة، والمركبات المضادة للالتهاب، والعوامل المساعدة في إنتاج الطاقة. كما يتم تقديم استراتيجيات عملية لدمج هذه السلوكيات في الحياة اليومية، مع التأكيد على الاستمرارية، والتفصيل الفردي، والسلامة. ويساهم تطبيق هذه المقاربات الحياتية في تحسين الأداء البدني، والوظائف المعرفية، وجودة الحياة بشكل عام، مما يدعم الشيخوخة الصحية والاستقلالية لدى البالغين فوق سن الخمسين.

- الكلمات المفتاحية : الشيخوخة الصحية؛ النشاط البدني؛ التغذية؛ المغذيات الدقيقة؛ البالغون فوق 50 سنة؛ التمارين البدنية؛ التدخلات الحياتية

1. Introduction

Population ageing represents one of the most significant demographic shifts of the 21st century, with profound implications for health systems, society, and individual well-being. Adults aged 50 years and older experience progressive physiological, metabolic, and functional changes that increase susceptibility to chronic diseases, mobility limitations, and cognitive decline (Harper, 2006; Payette & Shatenstein, 2005). Common age-related changes include reductions in muscle mass and strength (sarcopenia), decreased bone density, diminished cardiovascular and respiratory function, alterations in metabolism, and sensory impairments such as reduced vision and hearing (Taylor & al., 2005; Watson and al., 2015). These changes can negatively impact balance, mobility, and independence, thereby increasing the risk of falls, fractures, and chronic disease.

Concurrently, lifestyle factors—particularly physical inactivity and suboptimal nutrition—exacerbate these age-related declines (Williams and Donnelly, 2002). Evidence indicates that adults over 50 are at higher risk of cardiovascular disease, obesity, type 2 diabetes, and functional decline when sedentary or undernourished. Despite growing awareness, many older adults fail to meet recommended guidelines for physical activity and balanced nutrition, highlighting a gap between knowledge and practice (Tannenbaum & Shatenstein, 2008). Hawkley and Cacioppo, 2007; McPhee and al., 2016).

The purpose of this narrative review is to synthesize current evidence regarding physical activity, breathing practices, and nutrition for adults aged 50 years and older. Specifically, it aims to (i) summarize age-appropriate physical activities and their health benefits, (ii) discuss the role of nutrition and key micronutrients in maintaining functional health, and (iii) explore public health strategies for promoting sustainable lifestyle interventions. By integrating these perspectives, this review provides actionable insights to support healthy ageing and enhance quality of life in older populations.

2. Methods

This narrative review was conducted to summarize current evidence on physical activity, breathing practices, and nutrition for adults aged 50 years and older. A literature search was performed in major scientific databases, including PubMed, Scopus, and Google Scholar, covering articles published between 2005 and 2024. Keywords used in the search included combinations of *“older adults,” “aging,” “physical activity,” “exercise,” “strength training,” “nutrition,” “dietary intake,” “micronutrients,” “hydration,”* and *“public health.”*

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Inclusion criteria were: (i) studies involving adults aged 50 years and older, (ii) original research, reviews, and guidelines related to physical activity or nutrition, and (iii) publications in English. Studies focusing exclusively on younger populations or unrelated clinical conditions were excluded. Selected articles were analyzed qualitatively, with emphasis on identifying consistent findings, evidence-based recommendations, and public health implications.

This approach allows for a comprehensive synthesis of both observational and interventional evidence while maintaining transparency and reproducibility in the narrative review process.

3. Benefits of Physical Activity in Adults Aged 50 Years and Older

Advancing age is associated with progressive declines in muscle mass, bone density, cardiovascular function, flexibility, balance, and overall physical performance (Harper, 2006). These changes increase the risk of falls, fractures, chronic diseases, and loss of independence. Sedentary behavior further exacerbates these declines, contributing to higher body fat, elevated blood pressure, and increased susceptibility to metabolic and cardiovascular disorders, as well as mental health challenges such as depression and anxiety (Williams and Donnelly, 2002).

Regular physical activity has been consistently shown to counteract age-related physiological decline (Haskell, W. L., and al., 1985). Aerobic exercise improves cardiovascular efficiency, enhances lung capacity, and in weight management (Waite, 2004; McGettrick and al., 2018). Resistance and strength training help maintain or increase muscle mass and fiber size, particularly the phasic fibers responsible for strength and rapid contractions, mitigating sarcopenia (Greene and Adeyanju, 1991). Weight-bearing activities contribute to preserving bone

density, reducing the risk of osteoporosis and fractures (Paterson and al., 2007; Watson and al., 2015).

Exercise also benefits joint health by maintaining flexibility and reducing stiffness, which is particularly important for older adults with osteoarthritis (Conn et al., 2003). Moreover, engaging in regular physical activity improves metabolic regulation, accelerates energy expenditure, and helps maintain a healthy body weight appropriate for height and body composition (Grove and Spier, 1999; Lodge and al., 2016).

In addition to physiological benefits, physical activity supports psychological well-being. It enhances mood, reduces stress, and promotes cognitive function, which are critical for maintaining quality of life in older adults (DeLamater, 2012).

Key points:

- Muscle mass decreases ~3 kg per decade from middle age, but resistance training can reverse or slow this loss.
- Bone density declines accelerate after age 50, increasing fracture risk; weight-bearing exercise is protective.
- Aerobic and flexibility exercises enhance cardiovascular, respiratory, and joint health.
- Regular activity reduces body fat, improves metabolism, and supports mental health.

3.1 Types of Physical Activity and Breathing Exercises for Adults Aged 50 Years and Older

A physically active lifestyle is essential to mitigate age-related functional decline. Exercise programs for adults over 50 should be individualized, safe, and

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enjoyable, ideally developed in consultation with a healthcare professional to avoid aggravating preexisting conditions such as cardiovascular disease or musculoskeletal injuries (Rasmussen & Laumann, 2013).

Aerobic Exercise: Activities such as walking, swimming, cycling, and dancing engage large muscle groups, improve cardiovascular and respiratory function, and aid in weight management. Adults are encouraged to accumulate at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity per week, ensuring that intensity allows for comfortable conversation during exercise (Conn et al., 2003; Waite, 2004).

Strength and Resistance Training: Lifting hand weights, resistance bands, or performing body-weight exercises helps preserve muscle mass, maintain bone density, improve posture, and reduce the risk of falls and lower-back injuries. Initial programs may begin with light weights or low resistance for 8 repetitions, gradually increasing to 12 repetitions or higher as tolerated (Paterson and al., 2007; Greene and Adeyanju, 1991).

Flexibility and Balance Exercises: Stretching, yoga, and Pilates enhance joint range of motion, core stability, and balance, reducing the risk of falls. Incorporating flexibility routines at least two to three times per week supports mobility and functional independence (McGinnis, 1985; Jaul and Barron, 2017).

Breathing Exercises: Controlled breathing techniques can improve respiratory efficiency, oxygenation, and overall well-being in older adults (Vazirani, 2001). Practices such as diaphragmatic breathing, pursed-lip breathing, and structured mind–body techniques (e.g., pranayama) enhance lung capacity, alleviate ribcage stiffness, and modulate the autonomic nervous system, reducing stress and promoting relaxation (Allen, 1994). Correct posture is critical during

breathing exercises, as upright alignment allows for maximal lung expansion and effective ventilation (Stephens, 1991).

Practical Recommendations:

- Engage in activities that are enjoyable and sustainable to encourage adherence.
- Incorporate social elements, such as exercising with friends or family, to enhance motivation.
- Begin gradually, increasing intensity and duration over 6–8 weeks.
- Stay hydrated and wear appropriate clothing and safety equipment during physical activity (Adhvaryu and Beegle, 2012).
- Even short bouts of accumulated activity throughout the day confer significant health benefits (DeLamater, 2012).

Table 1. Recommended Physical Activities for Adults Over 50

Type of Activity	Examples	Frequency	Duration	Benefits
Aerobic	Walking, jogging, swimming, dancing	3–5 days/week	20–45 min/session	Improves cardiovascular fitness, weight management, endurance
Strength	Hand weights, resistance bands, bodyweight exercises	2–3 days/week	2–3 sets of 8–12 reps	Maintains muscle mass, bone density, posture, reduces injury risk
Flexibility	Stretching, yoga, Pilates	Daily or ≥3 days/week	10–20 min/session	Improves joint mobility, flexibility, reduces muscle soreness
Balance	Tai Chi, single-leg stance exercises	≥2 days/week	10–15 min/session	Reduces fall risk, improves stability and coordination
Breathing	Diaphragmatic, humming, Buteyko, complete breathing	Daily	5–10 min/session	Enhances oxygenation, lung capacity, relaxation, and mental clarity

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4. Nutrition for Active Adults Aged 50 Years and Older

Adequate nutrition is fundamental for maintaining muscle mass, bone health, cognitive function, and overall well-being in older adults. Age-related physiological changes, including reduced appetite, altered taste, and slower metabolism, can increase the risk of malnutrition and nutrient deficiencies (Leslie and Hankey, 2015). Optimal dietary patterns should focus on balanced macronutrient intake, sufficient hydration, and the inclusion of essential micronutrients.

4.1 Protein Intake

Protein is essential for preserving muscle strength, functional mobility, and metabolic health. Sarcopenia, or age-related muscle loss, is prevalent in adults over 50 (Barnhart, M., Peñaloza, L., 2013), and evidence suggests that higher protein intakes may be necessary compared with younger populations (Prendergast & Garattini, 2017). High-quality protein sources include lean meats, fish, dairy, legumes, and lentils. Current recommendations suggest 0.8–1.2 grams of protein per kilogram of body weight per day, adjusted according to individual activity levels and health status (Loosli, 1974).

4.2 Carbohydrates

Carbohydrates provide the primary energy source for daily activities and exercise. Older adults should aim for 45–65% of total daily calories from carbohydrates, preferably from whole grains, fruits, vegetables, legumes, and nuts to ensure adequate fiber intake and stable blood glucose levels (Sharon, 1980).

4.3 Dietary Fats

Dietary fats are important for cardiovascular health, hormone regulation, and cellular function. Emphasis should be placed on unsaturated fats from sources such as olive oil, nuts, seeds, and fatty fish rich in omega-3 fatty acids, which exhibit anti-inflammatory properties and support cardiovascular, cognitive, and joint health (Yoon and al., 2005; Perry & Wolburg, 2011). Total fat intake should represent 20–35% of daily calories, adjusted for energy requirements and individual health conditions (Porrini and al., 1991; Singal, P. & Sidhou L. S., 1983).

4.4 Hydration

Adequate hydration is critical, as aging can reduce the sensation of thirst and impair renal concentrating ability. Adults over 50 should aim for at least 2–3 liters of fluids per day, depending on sex, activity level, and environmental conditions (Zahid, 2018). Water, herbal teas, and low-sugar beverages are recommended, while high-caffeine and sugary drinks should be limited. Proper hydration supports cognitive function, digestion, thermoregulation, and joint health (Verdery & Margolis, 2017).

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Table 2. Macronutrient Recommendations for Adults Over 50

Nutrient	Recommended Intake	Key Food Sources	Benefits
Protein	0.8–1.2 g/kg/day	Lean meat, fish, dairy, legumes, lentils	Maintains muscle mass, strength, metabolism
Carbohydrates	45–65% of daily calories	Whole grains, fruits, vegetables, legumes, nuts	Energy, cognitive function, fiber for digestion
Fats	20–35% of daily calories	Olive oil, nuts, fatty fish (omega-3), avocado	Cardiovascular health, anti-inflammatory, cell membranes
Water	2–3 L/day (varies by sex and activity)	Water, herbal tea, fruits, vegetables	Hydration, thermoregulation, digestion, cognition

5. Micronutrients for Active Adults Aged 50 Years and Older

Micronutrients play a critical role in maintaining physiological function, preventing chronic disease, and supporting healthy aging. Deficiencies are common in older adults due to reduced dietary intake, malabsorption, and age-related metabolic changes. Key micronutrients for adults over 50 include antioxidants, anti-inflammatory compounds, and energy cofactors.

5.1 Antioxidants

Antioxidants counteract oxidative stress, which contributes to cellular aging, inflammation, and chronic disease development (Ames et al., 1993).

- **Coenzyme Q10 (CoQ10):** Naturally present in the body and in dietary sources, CoQ10 supports mitochondrial function and has been investigated for its anti-aging properties (Barcelos and Hass, 2019).
- **Glutathione (GSH):** A key intracellular antioxidant involved in detoxification and immune support. Supplementation may improve liver function, modulate oxidative stress, and provide systemic health benefits (Nicklett, 2020; Weschawalit and al., 2017).
- **Vitamins:** Daily intake of vitamins B12, C, and E is important for red blood cell production, neurological function, DNA synthesis, and skin health. Older adults may benefit from multivitamin supplementation tailored for age-related needs (& Molley, 2012).

5.2 Anti-inflammatory Micronutrients

Chronic low-grade inflammation contributes to age-related diseases. Nutrients that reduce inflammation include magnesium, vitamins B, C, D, and E, carotenoids, flavonoids, polyphenols, and omega-3 fatty acids (Kusumoto, D., & Suzuki, K. 2003; Finch, 2006; Verghese and al., 2012).

- **Polyphenols:** Plant-derived compounds that support cardiovascular, metabolic, and cognitive health, and may improve digestive function and weight management.
- **Omega-3 fatty acids:** Found in fatty fish, flaxseed, and walnuts, omega-3s reduce inflammation, support bone and joint health, enhance cognitive function, and help maintain healthy skin (Yoon and al., 2005; Perry & Wolburg, 2011; Reynolds and al., 2006).

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5.3 Energy Cofactors

Cofactors, often vitamins or derivatives, are essential for enzymatic reactions and energy metabolism.

- **Magnesium:** Supports energy production, neuromuscular function, and bone health. Older adults are often at risk of inadequate intake and may require dietary adjustments or supplementation (Bourre, 2004, 2006).
- **NADH (Nicotinamide adenine dinucleotide, reduced form):** Plays a role in cellular energy production and neurological function. Preliminary research suggests potential benefits for memory and cognition in neurodegenerative conditions (Bell and Somers, 2016).

Ensuring sufficient intake of these micronutrients—through a combination of diet and, if necessary, supplementation—supports physical performance, cognitive health, and overall well-being in adults over 50.

Table 3. Key Micronutrients for Adults Over 50

Micronutrient	Source	Function	Potential Benefits
Vitamin B12	Meat, fish, dairy, fortified cereals	Red blood cell formation, DNA synthesis	Prevents anemia, supports cognitive health
Vitamin D & Calcium	Dairy, eggs, sunlight, fortified foods	Bone health	Reduces risk of osteoporosis, fractures
Antioxidants (CoQ10, Glutathione, Vitamins C & E)	Fruits, vegetables, nuts, supplements	Protects cells from oxidative stress	Anti-aging, metabolic support, immune function
Magnesium	Nuts, seeds, whole grains	Enzyme cofactor, muscle function	Supports neuromuscular health, energy metabolism
Omega-3 Fatty Acids	Fatty fish, flaxseed, walnuts	Anti-inflammatory, cardiovascular support	Cognitive function, reduced inflammation, bone health
Polyphenols & Flavonoids	Berries, tea, vegetables	Antioxidant, anti-inflammatory	Supports cardiovascular, metabolic, and cognitive health

6. General Advice for Adults Aged 50 Years and Older

Maintaining a healthy lifestyle after the age of 50 requires a combination of regular physical activity, balanced nutrition, and lifestyle modifications (Turner

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and al.,2018). Evidence-based recommendations are outlined below (Neck, C. P., Cooper, K.H., 2000).

6.1 Physical Activity

- Adults over 50 should aim for daily physical activity, as any movement is better than none.
- Include strength, balance, and flexibility exercises at least two days per week to enhance musculoskeletal health and reduce fall risk (Wagner and al., 2003; Jaul and Barron, 2017).
- Accumulate at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity weekly, or a combination thereof, while reducing sedentary behavior by breaking up prolonged sitting periods.
- Take safety precautions: select exercises appropriate for individual capabilities, use proper equipment, and avoid overexertion (Institute of Medicine (US) Food Forum, 2010).

6.2 Nutrition

- Consult a registered dietitian to assess and optimize dietary needs based on individual health status, activity level, and age (Leslie and Hankey, 2015).
- Prioritize diets rich in calcium, vitamin D, high-quality proteins, healthy fats, fiber, and hydration to support bone, muscle, and cardiovascular health (Pellegrini and Smith, 1998; Fiske and al., 2009).
- Limit sodium intake to reduce hypertension risk and maintain healthy weight (Burstyn and al., 1980).

- Consider probiotics to support gastrointestinal health and immune function, and incorporate vitamins C and E to promote skin integrity (White and al., 2015).
- Consistency in dietary habits and physical activity is key to achieving long-term health benefits (Meehan and Penckofer, 2015).

7. Limitations

While this narrative review provides a comprehensive synthesis of current evidence regarding physical activity, nutrition, and micronutrient strategies for adults over 50, several limitations should be acknowledged.

1. **Study Design Limitations** : Most of the included studies were observational or cross-sectional, which limits the ability to establish causal relationships between lifestyle interventions and health outcomes. Randomized controlled trials remain limited in number, particularly for long-term adherence and effects of combined exercise and nutrition interventions.
2. **Heterogeneity of Study Populations** : The studies reviewed varied widely in participant characteristics, including age ranges, baseline health status, comorbidities, and cultural or geographical contexts. This heterogeneity may affect the generalizability of the recommendations to all adults over 50.
3. **Variability in Intervention Protocols** : Differences in exercise modalities, intensity, frequency, and duration, as well as nutritional interventions and supplementation protocols, make it challenging to draw standardized recommendations. The diversity of methodologies may also influence outcome measures and comparability across studies.

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4. **Limited Data on Micronutrient Supplementation** : While evidence supports the role of key micronutrients in healthy aging, there is limited consensus on optimal dosages, long-term safety, and interactions with medications commonly used by older adults. Individual variability in absorption and metabolism may further complicate recommendations.
5. **Publication Bias and Language Restriction** : This review included studies published in English, potentially excluding relevant research in other languages or unpublished data, which may introduce publication bias.
6. **Narrative Review Methodology** : As a narrative review, this work did not employ formal meta-analytic techniques, limiting quantitative synthesis and assessment of effect sizes. Consequently, the findings should be interpreted as evidence-informed guidance rather than definitive clinical guidelines.

Despite these limitations, the review highlights evidence-based strategies that can support functional health, cognitive performance, and quality of life in adults over 50, and underscores the need for future research addressing long-term, integrated lifestyle interventions.

Conclusion

Adults aged 50 years and older face age-related physiological changes that affect cardiovascular, musculoskeletal, cognitive, and metabolic function. Evidence demonstrates that regular physical activity, including aerobic, strength, and flexibility exercises, combined with controlled breathing techniques, significantly mitigates these declines and promotes functional independence. Adequate nutrition, with attention to macronutrients, hydration, and essential

micronutrients such as antioxidants, anti-inflammatory compounds, and energy cofactors, supports overall health, cognitive performance, and quality of life.

Integrating these lifestyle strategies into daily routines, tailored to individual capabilities and health conditions, provides a practical framework for healthy aging. Consistent adherence to recommended physical activity and nutritional guidelines not only enhances longevity but also improves well-being, mobility, and resilience in adults over 50. Future research should continue to refine age-specific recommendations and investigate synergistic effects of diet and exercise on aging outcomes.

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