(Under)treatment of pain in dementia

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Review Section

Chapter 2

Physical inactivity in aging and dementia: a review of its relationship to pain

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Abstract

Aims. The goal of this brief review is to address studies examining the relationship between physical inactivity and pain in aging and dementia.

Background. A decrease in the level of physical activity is characteristic of older persons, both with and without dementia. Passive behaviour is often considered to be part of the apathy frequently observed in patients with dementia, although it could also be a sign of pain.

Design. Literature review.

Method. Searches were performed in PubMed and Embase. A total of 15 studies concerning the relationship between physical inactivity and pain in older persons with and without dementia were identified (older persons without dementia: 12; with dementia: 3).

Results. In older persons without dementia, a positive relationship between physical inactivity and pain has been demonstrated. In older persons with dementia, pain may cause physical inactivity and physical inactivity may cause pain.

Conclusions. In older persons, a positive relationship between physical inactivity and pain was demonstrated. More specifically, pain may cause physical inactivity. In older persons with dementia pain may cause physical inactivity and vice versa.

Relevance to clinical practice. Nurses' awareness of physical inactivity as an indication of pain in older persons with and without dementia may reduce the risk of underdiagnosis and subsequent undertreatment of pain.

Introduction

Epidemiological studies show a negative relationship between the level of physical activity and the risk of dementia (Fratiglioni et al., 2004; Rovio et al., 2005). Additionally, a decrease in gait speed during walking has been associated with declines in cognitive functioning that cannot be explained by demographic variables, e.g. education or age (Rosano et al., 2005). These findings suggest that increasing the level of physical activity may improve cognitive functioning. Indeed, an increase in cognitive functioning in formerly sedentary older people has been shown after a walking intervention during six months (Kramer et al., 1999). In that study, those participating in the aerobic training showed a significant improvement in tasks measuring executive functioning compared with controls participating in an anaerobic training. Also in patients with mild cognitive impairment (MCI), physical activity improved executive functioning (Scherder et al., 2005). In that study, the physical activity intervention consisted of walking with a rollator (i.e. walking aid), which has been proven to be capable of improving aerobic fitness (Eggermont et al., 2006). Even in patients at risk of dementia, a walking program resulted in improved cognitive functioning (Lautenschlager et al., 2008).

Considering the positive effects of physical activity, it is unfortunate that older persons, in particular those with dementia, show a decrease in the level of physical activity (Westerterp & Meijer, 2001; Burns et al., 2008). More specifically, an inverse relationship between age and level of physical activity has been demonstrated. For example, people aged over 90 years are less physically active than people aged 60–74 years and those aged 20–34 years (Johannsen et al., 2008). When compared with older persons without dementia, those with dementia living in nursing homes are even less engaged in daytime physical activity (Paavilainen et al., 2005).

Of note is that, in patients with dementia, passive behaviour may be a prominent symptom of apathy (Colling, 2000). The high prevalence of apathy in many neurodegenerative disorders (e.g. 22.6–93.6% in vascular dementia; Ishii et al., 2009) gives rise to the question of whether passive behaviour in patients with dementia challenges nursing staff to consider conditions other than apathy, e.g. pain. For nurses and physicians,

realizing that pain might cause physical inactivity is even more difficult because most pain observation scales include items relating pain to physical restlessness (Herr et al., 2006). On the other hand, it is known that, with advancing age, an increase in the number of chronic pain conditions, for example, osteoarthritis, is strongly associated with a decline in the level of physical activity (Issa & Sharma, 2006; Tsang et al., 2008). Besides musculoskeletal disorders, several neurodegenerative diseases, such as vascular dementia, are characterized by increased levels of pain, due to white matter lesions (Oosterman et al., 2006; Scherder et al., 2009). Addressing the relationship between physical inactivity and pain in older persons with and without dementia is clinically relevant, because nurses' awareness of physical inactivity as an expression of pain may contribute to early detection and treatment.

Aims and Methods

The aim of this review is to describe the relationship between physical inactivity and pain in older people with and without dementia. Combinations of search terms such as dementia, cognitive defect, MCI, aged, pain, motor (in)activity, locomotion, activities of daily living, exercise, passivity and physical (in)activity were entered in PubMed and Embase. The searches were limited to human studies in the English language.

Abstracts of full-length articles were carefully read. Subsequently, the appropriate full-length articles were collected and included in this review. As the final number of studies examining the relationship between physical inactivity and pain in cognitively intact older people and older people with dementia was limited, all studies (n = 15) were included in this review (older people without dementia: n = 12; older people with dementia: n = 3). See Figure 1 for an overview of the literature search.

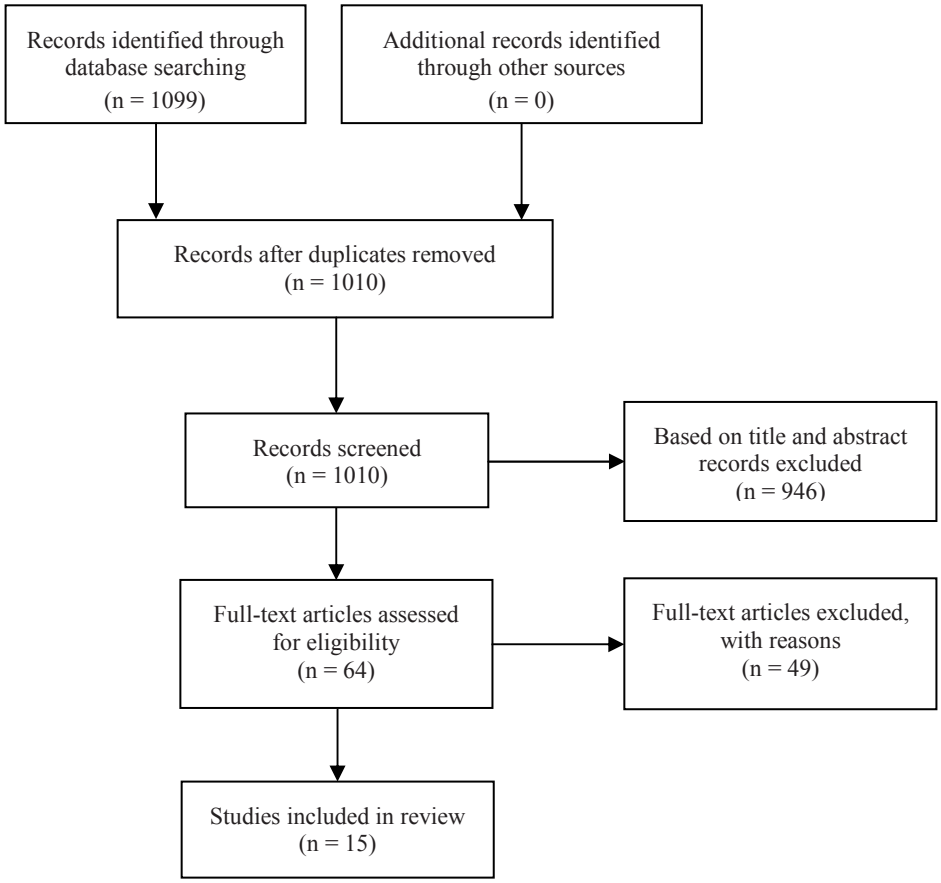

Figure 1. Overview of the literature search.

Results

Physical inactivity and pain in older persons without dementia

Relationship between physical inactivity and pain

A strong negative relationship between knee pain and the level of physical activity was present in people with a chronic pain condition, i.e. osteoarthritis (Tsai et al., 2003). More specifically, higher scores on the knee pain scale were associated with less physical activity, measured as walking around spontaneously before and after the interview. In older

women, it was shown that increasing levels of knee pain increased the risk of physical inactivity, i.e. walking fewer than three city blocks per week, although the exact estimate of this distance remains obscure (Lamb et al., 2000). Similarly, severe pain was identified as a risk factor for physical inactivity in men and women with arthritis (Kaplan et al., 2003). In that study, physical inactivity was defined as participating in physical activities for 15 minutes or less, three times per month or less. Similarly, men and women suffering from another chronic pain condition, i.e. back pain, were significantly less physically active in the year before the measurement, compared with people without back pain (Cecchi et al., 2006). Notably, irrespective of the presence of a chronic pain condition, pain reduces the percentage of people meeting the recommended level of physical activity, i.e. 1000 kcal/week (Ashe et al., 2008).

The reverse has also been observed. For example, completely sedentary older women had a higher risk of having frequent back pain than women who participated in recreational physical activity (Smith et al., 2006). Other studies show that lower baseline levels of physical activity were associated with more pain after two or three years (Hartvigsen & Christensen, 2007; Heesch et al., 2007). By including only older people without pain at baseline, they increased the likelihood that the occurrence of pain during the two years was caused by physical inactivity and not vice versa (Hartvigsen & Christensen, 2007; Heesch et al. 2007). Notably, in both studies, a dose–response gradient was present, i.e. the higher the baseline level of physical activity, the less pain was reported after two or three years. The presence of a dose–response gradient supports the existence of a causal relationship. However, because of the correlative nature, these studies are still unable to provide unconditional proof of the existence of a causal relationship between physical inactivity and pain (Table 1).

Pain as a cause of physical inactivity

As part of a population-based study of Danish twins, participants were asked whether they had altered or diminished their physical activities owing to back pain (Hartvigsen et al., 2006a,b). About half of the participants who had experienced back pain for more than 30 days in the

previous year reported that they had done so. This finding shows that people themselves believe that pain is a cause of their physical inactivity. Support for this finding has been found in a somewhat wider age range. Adults aged 60–84 who underwent outpatient surgery reported 'to stay still or not move' as the most chosen non-pharmacologic strategy to alleviate pain (Kemper, 2002). In addition, people aged 64–99 receiving nursing care in their homes reported that initiating physical activity caused increased pain levels (Ross & Crook, 1998) (Table 1).

Physical inactivity and pain in older persons with dementia

To our knowledge, there have been only a few studies focusing on the relationship between pain and physical inactivity in older people with dementia, i.e. pain as a cause of physical inactivity and physical inactivity as a cause of pain (Table 2).

Pain as a cause of physical inactivity

A study recording nurses' perceptions of the assessment and treatment of pain in patients with late-stage dementia (Kovach et al., 2000) included the observations of a nurse who commented about the use of morphine in an older woman with arthritis. The nurse stated that after the woman had received morphine, she 'went back to doing activities and started to live a normal life again'. It has also been suggested that untreated pain in nursing home residents with moderate-to-severe dementia may inhibit physical activity and that pain thus limits engagement with the environment (Chibnall et al., 2005). In that placebo-controlled study, participants who received acetaminophen (3000 mg/day) for four weeks exhibited higher levels of general activity than those who received a placebo. The rigorous design of this study provides strong evidence for a causal relationship between pain medication and activity level.

Physical inactivity as a cause of pain

We found only one study that suggested that physical inactivity causes pain in older people with dementia (Blomqvist & Hallberg, 2001). In that study, 19 older adults without cognitive impairment, their contact nurses

and the contact nurses for 24 cognitively impaired older adults took part in interviews. These interviews evaluated factors including the way the patients expressed pain and the possible sources of pain. The contact nurses for nine of the cognitively impaired older adults regarded immobility as an important source of the experienced pain (Blomqvist & Hallberg, 2001).

Conclusions

- In older persons without dementia, a positive relationship between physical inactivity and pain has been demonstrated. A causal relationship between pain and physical inactivity, i.e. pain may cause physical inactivity, is supported only by older persons' own comments.
- In persons with dementia, the few available studies suggest that pain may cause physical inactivity and vice versa.

Relevance to clinical practice

- The awareness by the nursing staff that physical inactivity might indicate pain in older people with or without dementia reduces the risk of undertreatment of pain. More specifically, older people without dementia frequently choose not to communicate about pain they experience because of the fear of negative consequences, such as hospitalisation (Robinson, 2007). In dementia, pain is often underdiagnosed owing to factors including a decline in communicative capacities, complicating pain assessment (McAuliffe et al., 2009; Scherder et al., 2009).
- In addition to pain, a decline in cognitive functioning has been associated with a decrease in physical activity (e.g. walking) in healthy older persons (Rosano et al., 2005) and may even be an early manifestation of dementia (Fratiglioni et al., 2004). Early acknowledgement of pain by the nursing staff and subsequent adequate pain treatment may reduce the level of physical inactivity and may, consequently, have a positive influence on cognitive functioning.

Table 1. Characteristics of studies on the relationship between pain and physical inactivity in older persons without dementia.

Authors	Sample	N [m/f]	Design	Pain measurement	Physical Activity Measurement	Results
Ashe et al., 2008	Canadian older people (aged > 65)	24,233 [9,693/ 14,540]	Population-based self-report telephone survey	Derived from the HUI Mark III, dichotomized (pain, no pain)	Checklist of 22 physical activities in the past 3 months. LTPA (Kcal/week) = MET x time spent on the activity during the week	Presence of pain reduced the proportion of people engaging in PA.
Cecchi et al., 2006	Italian older people (aged > 65)	1,008 [443/565]	Cross-sectional	Frequency of back pain over the previous 12 months. 2 groups: no frequent back pain; frequent back pain	PA level: 6-point scale	*Negative* association between BP and PA.
Hartvigsen & Christensen, 2007	Danish twins without back pain (aged 70-100)	1,387 [671/716]	Prospective cohort study	Modified version of the Standardized Nordic Questionnaire on musculoskeletal disorders	Questions about light and strenuous PA, and frequency	No association between LBP and light PA. *Negative* association between LBP and strenuous PA.
Hartvigsen et al., 2006a	Danish twins (aged 72-102)	1,844 [815/1,029]	Cross-sectional interview data	Modified version of the Standardized Nordic Questionnaire on musculoskeletal disorders	Diminished or modified physical activities during the past year due to LBP (yes, no)	13% had diminished or modified PA due to BP. Both duration and intensity of pain are associated with modifying or diminishing PA.
Hartvigsen et al., 2006b	Danish twins without back pain (aged 70-100)	1,387 [671/716]	Prospective cohort study	Modified version of the Standardized Nordic Questionnaire on musculoskeletal disorders	Altered or diminished physical activities during the past year due to LBP (yes, no)	67% of participants with LBP >30 days in the previous year had altered or decreased their PA's due to LBP.

Authors	Sample	N [m/f]	Design	Pain measurement	Physical Activity Measurement	Results
Heesch et al., 2007	Australian women without pain at baseline (Middle-aged: aged 48-55; Older: aged 72-79)	Middle-aged: 4,780 [0/4,780] Older: 3,970 [0/3,970]	Prospective association study	'Stiff or painful joints' in the previous 12 months, two dichotomizations ('never or rarely', 'sometimes or often', and 'not often', 'often')	PA = MET x time spent on the activity	*Negative* association between any level of PA and developing 'stiff or painful joints' over 3 years in older group. Dose-response gradient present.
Kaplan et al., 2003	Canadian older adults with arthritis (aged > 65)	6,256 [1,975/4,281]	Cross-sectional	Dichotomized: 'no pain', 'mild to severe pain'	LTPA 2 groups: inactive = zero to 3 times of LTPA per month; active = more than 3 times of LTPA per month	*Negative* relationship between LTPA and severe pain.
Lamb et al., 2000	Older women with physical disability, MMSE >18/30 (aged 65-101)	769 [0/769]	Cross-sectional	Visual analogue scale (0-10)	Number of city blocks walked in the week before the interview	*Negative* relationship between PA and severe pain.
Smith et al., 2006	Young (aged 18-23),middle-aged (aged 45-50) and older (aged 70-75) Australian women	Young: 14,060 [0/14,060], middle-aged: 13,004 [0/13,004], older: 10,986 [0/10,986]	Cross-sectional	Bodily pain subscale of the SF-36 (Never, rarely, sometimes, often)	Questions modified from the 1980-1989 Australian National Health Foundation Risk Factor Prevalence Studies	*Negative* association between PA and BP in older women, not in young and middle-aged women.
Tsai et al., 2003	Nursing clinic patients with OA and knee pain (aged > 65)	12 [1/11]	Correlational	KPS and the 5-item pain scale of the WOMAC OA subscale	Number of visits during which the participant was walking before and after the interview	*Negative* association between KPS score and activity level.

Authors	Sample	N [m/f]	Design	Data collection	Results
Kemper, 2002	Patients after surgery (aged 60-84)	93 [49/44]	Qualitative	Telephone-based interview. One of the questions was: 'From this list of non-pharmacologic activities, which activities helped relieve pain?'	The most frequently selected answer was 'to stay still or not move'.
Ross & Crook, 1998	Home-dwelling elderly (aged 64-99)	66 [?]	Qualitative	Interview with questions about characteristics of pain, e.g. aggravating factors, and other points	Initiating physical activity, e.g. walking was most frequently reported.

BP = Back Pain; HUI Mark III = Health Utility Index Mark III; Kcal = kilocalories; KPS = Knee Pain Scale; LBP = Low Back Pain; LTPA = leisure time physical activity; MET = metabolic equivalent of the task; MMSE = Mini Mental State Examination; OA = osteoarthritis; PA = physical activity; SF-36 = Short Form 36; WOMAC = Western Ontario and McMaster.

Table 2. Characteristics of studies on the relationship between pain and physical inactivity in older persons with dementia.

Authors	Sample	N [m/f]	Design	Data collection	Results
Blomqvist & Hallberg, 2001	Dementia nos (N = 42) Normal cognition (N = 24) (aged >65)	66 [20/46]	Qualitative	People with dementia: contact nurses were asked how they recognized pain and about their beliefs concerning the source of the pain. People with normal cognition: interviews were carried out using open-ended questions focussing on how they believed they expressed pain and to elicit their views on the source of the pain.	Immobility was considered the source of pain in 9 people with dementia.
Kovach et al., 2000	Patients with late-stage dementia nos (age not known)	1 [0/1]	Qualitative	Semi-structured interviews were used to ask nurses to describe their experiences with recognizing, assessing, and treating pain, and to describe other experiences with pain in patients with dementia.	One nurse stated that a woman 'went back to doing activities and started to live a normal life again' after she had received morphine.

Authors	Sample	N [m/f]	Design	Intervention	Relevant Dependent Variables	Results
Chibnall et al., 2005	Dementia nos (N = 13), AD (N = 8), Multi-infarct dementia (N= 4) (aged > 65)	25 [3/22]	Randomized, double-blind, placebo-controlled, crossover trial	Acetaminophen (3,000 mg/day), 4 weeks, and placebo, 4 weeks	Behaviour was assessed using Dementia Care Mapping	Participants spent more time in media engagement, direct social interaction, and work-like activity during intervention than during placebo.

AD = Alzheimer's disease; mg = milligram; nos = not otherwise specified.

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