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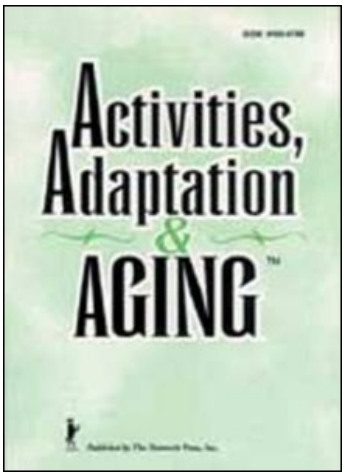

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Observing Body Position of Older Adults While Gardening for Health Benefits and Risks

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Observing Body Position of Older Adults While Gardening for Health Benefits and Risks

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Gardening is a moderate intensity physical activity for older adults. Thus, health benefits are possible, however, body positions while gardening, such as stooping, kneeling, and squatting, may be uncomfortable. The purpose of this study was to characterize both the type of gardening tasks done by older adults and their body positions while performing the tasks so that safe and effective gardening programs for elders could be designed. In this study, 14 older gardeners were observed on two separate occasions and the types of gardening tasks and body positions used during gardening were recorded. Bodily pain during gardening by the older gardeners was self-reported. Seventeen different garden tasks were observed. While conducting these tasks, six body positions were used by 90% of the subjects: gripping, bending, walking, lifting, stretching, and standing. Ten different bodily pains were reported with lower back pain reported the most. These results show that older gardeners use body positions during gardening that can provide both health benefits and risks. Biomechanical characterization of gardening through kinematics and kinetics is needed.

KEYWORDS physical activity, bodily pain, lower back pain, human issues in horticulture

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Gardening is a popular leisure-time activity for adults age 65 or older (Yusuf et al., 1996). The health benefits of gardening as a form of physical activity for older adults have been reported (Armstrong, 2000; Walsh, Pressman, Cauley, & Browner, 2001). In our previous research, gardening by older gardeners was determined to be moderate intensity physical activity and the older gardeners met the physical activity recommendation for health (at least 30 minutes of moderate intensity physical activity on most days of the week) through their daily gardening (Park, Shoemaker, & Haub, 2008). Older gardeners also reported better overall physical health and hand function abilities (hand strength and pinch force) than nongardening older adults (Park, Shoemaker, & Haub, 2009). Reynolds (1999) reported that grip strength improved after a 6-month gardening program and improvement in cardiovascular fitness was expected because gardening activities elevated the heart rate of participants. Gardening is an activity that is expected to influence whole-body bone mineral density because it includes weight-bearing motions such as pushing a mower, digging holes, pulling weeds, carrying soil, and so forth, and because it uses the entire body (Turner, Bass, Ting, & Brown, 2002). Another study by Reynolds (2002) showed improvement in mental health and depression through a 3-month gardening program.

Although gardening may provide many physical health benefits, it may also burden the body or cause injury. Stoffert (1989) reported that stooping, kneeling, and squatting are the most uncomfortable and dangerous positions for the body during gardening. Stooping overburdens the spine and causes more than normal blood flow to the brain. Kneeling places pressure on kneecaps and knee joints. Highly flexed knees and external pressure on the knees during kneeling may cause complaints of knee pain (Kivimäki, Riihimäki, & Hänninen, 1992; Thun et al., 1987). Squatting requires a maximal bending of knee joints and hip joints. A flexed position in working has been reported as a cause of lower back pain (Maeda, Okazaki, & Suenaga, 1980; Stubbs, Buckle, & Hudson, 1983). Digging with a conventional spade was determined to be a probable cause of lower back injury (Bridger, Sparto, & Marras, 1998). Therefore, for older gardeners many gardening positions can result in fatigue, physical pain, and injuries.

The purpose of this investigation was to characterize both the types of gardening tasks done by older adults and their body positions while performing the tasks so that safe and effective gardening programs for elders could be designed. This study was part of a larger investigation characterizing gardening activities to preserve physical function in older adults. Because gardening is a moderate intensity physical activity, it has the potential to offer many of the health benefits associated with maintaining a physically active life. Thus, as a popular leisure-time activity for older adults, gardening has the potential to be an effective strategy for physical health maintenance and improvement. However, the strain to muscle and joints may limit the benefits.

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METHODS

Participants

Fourteen gardeners over age 62 were recruited from the community of Manhattan, Kansas. To meet the criteria for participation participants were age 60 and older and considered themselves gardeners. In an orientation, informed written consent was obtained, a brief explanation of the experimental procedures was given, and a demographic questionnaire was administered to obtain information on age, race, height, weight, and prevalence of chronic diseases.

Observational Study

This study was conducted in Manhattan, Kansas, at the participants' own garden plots in June and July 2006 in the morning or evening (to avoid the hottest part of the day). The observational data sheet and training of the observers were pretested in spring 2006.

Although not feasible in many cases, observation in the actual setting is a useful method for getting information about actual behavior (Shoemaker, Relf, & Lohr, 2000). Recording people's behavior provides a direct indicator of human activities in a particular environment. Behavior measures are a means of directly observing and measuring human activities, which have many advantages, the most obvious of which is their face validity (Vining & Stevens, 1986). Predny and Relf (2000) employed observation in their study to show the interactions of children and older people during horticultural therapy activities.

Two observers (a graduate student and an undergraduate student in the Horticulture, Forestry and Recreation Resources Department at Kansas State University) observed each participant gardening in their own garden on two separate occasions. The observational data sheet allowed the observers to easily record the gardening tasks observed (kinds of gardening tasks and body positions used during each garden task) and, using a stopwatch, the time spent on each gardening task (Park et al., 2008). The data sheet also included a section for the observers to record the tools used during each gardening task. Garden tasks performed less than 10 seconds at a time were not included in the data analysis. There were no limitations by the researchers on what gardening tasks the participants performed or how long they gardened, and none of the participants gardened for more than 2 hours. The participants conducted their gardening tasks freely without any limitation or interference from the researchers, and during gardening they could take a rest if they wanted to.

Survey Instrument

A questionnaire was developed by the researchers to investigate bodily pain of older gardeners while gardening. The participants were asked to

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report on any bodily pain or injuries experienced during their daily gardening activities.

RESULTS

Demographic Information

Participants were age 63–86, and there were five females and nine males. Subjects were not overweight and 42.9% had no current chronic diseases. Of those with chronic disease the most prevalent were high blood pressure and arthritis. Arthritis was the only chronic disease that limited activity (Table 1).

Observational Study

A total of 35 different gardening tasks were observed during the study. Observation agreement of the two observers was 79.2%. Seventeen of the gardening tasks were performed by 90% of the participants (Table 2). Six distinct positions were used in performing these tasks (Table 3). Gripping and bending were observed in more than 80% of the gardening tasks. Walking and lifting also showed high percentages.

Self-Reported Bodily Pain While Gardening

When the question, "Do you experience pain when gardening?" was asked, almost 60% of the participants answered they had bodily pain while gardening (always = 7.1%; sometimes = 50%; never = 35.7%; 1 missing data). Of those that reported bodily pain during gardening, the majority reported a low

TABLE 1 Descriptive Characteristics and Chronic Diseases

	M	*SD*
Age (year)	72	8
Race	Caucasian	
Height (cm)	168.9	7.0
Body weight (kg)	80.1	14.0
Body mass index ($kg \cdot m^2$)	28.1	5.0
Current chronic disease	Percentage (%)	
No chronic disease	42.9	
High blood pressure	21.4	
Lung disease	7.1	
Diabetes	7.1	
Cancer	7.1	
Arthritis	35.7 (7.1)[a]	
Asthma	21.4	

[a]Percentage that indicated that the disease limited activity.

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TABLE 2 Gardening Tasks

Tasks observed[a]	Positions observed[b]	Percentage who performed the task (%)
Weeding	B, G, S	92.9
Walking	G, L, W	92.9
Cleaning tools, hands, or produce	B, G, L, W	92.9
Resting	ST	92.9
Carrying tools	G, L, W	78.6
Storing tools or produce	B, G, L, W	78.6
Harvesting	B, G, S, W	71.4
Watering	B, G, S, L, W	50.0
Gardening preparation	B, G, L, W	50.0
Observing plants in the garden	B, G, W	50.0
Cutting flowers or stems	B, G	35.7
Pruning	B, G	28.6
Mowing	B, G, S, W, P	21.4
Deadheading	B, G, S, L, W	21.4
Digging	B, G, L	21.4
Mulching	B	14.3
Planting plants	B, G	14.3

[a]Daily gardening tasks of the 14 older gardeners were observed two times by two trained observers. Tasks done by less than 10% of the participants are not shown.
[b]Positions observed by both observers and done by more than 50% of the participants.
B: Bending; G: Gripping; S: Stretching; L: Lifting; W: Walking; ST: Standing; P: Push/pull.

TABLE 3 Primary Gardening Positions Observed

Physical position[a]	Percent (%) of the 17 observed gardening tasks that had this position
Gripping	88.2
Bending	82.4
Walking	58.8
Lifting	47.1
Stretching	29.4
Standing	5.9

[a]Positions that were done by 50% or more of the participants in each task and that were witnessed by both observers.

(50%) to moderate (37.5%) pain level. Lower back pain (62.5%) was reported by the most subjects (Figure 1). No participants reported injuries that were the result of gardening.

DISCUSSION

Results of this observational study show both the physical positions done while gardening and the types of bodily pains older gardeners experience. Lower back pain was the prevalent bodily pain reported. The gardening

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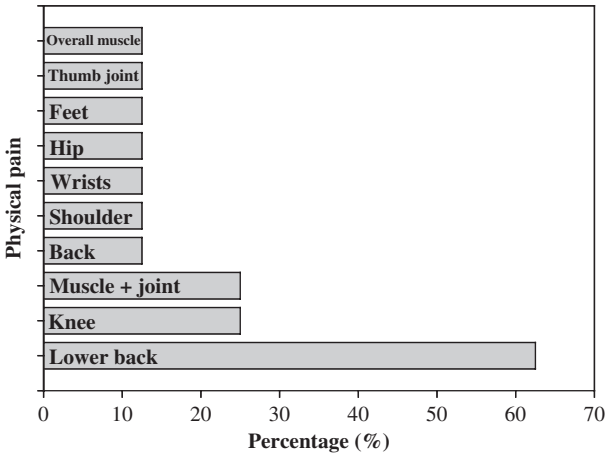

FIGURE 1 Percentages of self-reported bodily pain during gardening.

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positions of bending, lifting, and stretching may either help or exacerbate this pain.

Bending overburdens the spine and causes more blood to flow to the brain than normal. Moreover, working in a flexed position has been reported as a cause of lower back pain (Maeda et al., 1980; Stubbs et al., 1983).

Flexibility is the most important factor of fitness in older adults because mobility (Rikli & Edwards, 1991) and an adequate range of motion are necessary to be able to perform activities of daily living (ADL) (Tinetti, Baker, & Garrett, 1993). Strength is also a crucial element for performing ADLs and decreased muscle strength can cause low functional ability. If done properly, as observed in this study, lifting and stretching while gardening could be good positions for body strength and flexibility. Older gardeners should be aware of their physical fitness level to prevent lifting or moving excessively heavy loads and overburdened stretching. For example, several small loads instead of one large load can be prepared when the gardener needs to lift or shift loads such as bags of compost (Arthritis Research Campaign, 2003).

Almost all of the gardening tasks included a gripping position, which may help in maintaining and improving hand strength. In our previous research, older gardeners had greater hand strength and pinch force than older nongardeners (Park et al., 2009). However, for older gardeners with arthritis, gripping tightly can cause pain and swelling of the knuckles. Adapted tools, such as clippers with spongy rubber sleeves on the handles and two-handed loppers, can reduce effort and be held lightly to protect finger joints from strain (Arthritis Research Campaign, 2003).

Walking is the most popular leisure-time physical activity for older adults (Yusuf et al., 1996). The health benefits of walking in older adults

have been reported (Centers for Disease Control and Prevention, 1993; Duncan, Gordon, & Scott, 1991; Rippe, Ward, Porcari, & Freedson, 1988; Shin, 1999). Older gardeners performed significant walking positions while gardening so it is expected that older gardeners can experience the same health benefits, such as improvement of cardiorespiratory fitness, through their daily gardening. Additionally, because a garden requires regular and continuous care (Relf, 1981) and is a long-term focused activity (Restuccio, 1992), walking will naturally occur.

In conclusion, the positions used during gardening can provide both health benefits and risks. In order to utilize gardening as a physical activity for health in older adults, the risks of gardening need to be clearly understood. Future research should investigate specific solutions to address the uncomfortable and dangerous gardening positions to increase the health benefits of gardening.

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