

Workplace Foam Roller Exercise for Hotel Housekeepers: An Exploratory Study

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Abstract

Hotel housekeepers face multiple serious work-induced hazards that can cause occupational disabilities affecting their health. This study investigated the short-term impact of a foam roller exercise as an intervention to improve hotel housekeeper range of motion (ROM). Researchers conducted a quasi-experimental study among hotel housekeepers at two hotels. Five housekeepers at the first hotel participated in 30-minute per day group foam roller exercises during a six-week study period. Seven housekeepers at the second hotel served as a comparison group, not participating in the exercises but completing the range of motion measurements at the beginning and end of the study. Interviews were conducted among the experimental exercise group to obtain their personal feedback regarding the foam roller exercises. This study found significantly improved range of motion in the shoulders, hips, and wrists of the exercise group after six weeks of daily foam roller exercises. No significant changes in range of motion were found in the comparison group. Qualitative data collected from interviews with exercise participants revealed the following benefits of the group foam roller exercises: muscle relaxation, reduction of body pain, providing a feeling of overall wellness, enhancing energy, and improving team relationships. This study provides evidence that foam roller exercises may be an effective intervention to improve range of motion for hotel housekeepers and may mitigate their body pain induced by their cleaning tasks. Foam rollers are user-friendly and cost-effective and can be used by hotel housekeepers or workers involved in physically demanding jobs as recovery tools.

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Introduction

The tourism industry is one of the largest economic sectors in the world, employing more than 319 million people (World Travel and Tourism Council, 2019). Among these workers, hotel housekeepers comprise a significant occupational segment. Although housekeepers have been described as “silenced and invisible” (Onsøyen et al., 2009), they play an important role in contributing to the core product of a hotel: a clean guestroom. Without their hard work, the service quality, guest satisfaction levels, and profitability of these establishments would suffer, and this would negatively impact the tourism industry as a whole (Powell & Watson, 2006).

Hotel housekeepers have a physically demanding job that entails repetitive movements. In the process of performing cleaning tasks, a hotel housekeeper typically changes their body position on average once every three seconds, yielding 8,000 different body postures per eight-hour shift (CCOHS, 2016). It is not surprising that housekeepers have the highest rates of musculoskeletal disorders (3.2 cases per 100 workers) among all hotel employees (Buchanan et al., 2010). Many even suffer severe physical pain or work-related musculoskeletal disorders (WMSDs) that can cause disabilities and severely impact their occupational health and quality of life (Krause et al., 2005; World Health Organization, 2003). In addition to physical hazards, hotel housekeepers are exposed to a wide variety of work-induced hazards, such as chemical, biological, and psychosocial hazards (Hsieh et al., 2013). They have been identified as a highly underserved and understudied occupational group (Buchanan et al., 2010; Sanon, 2014).

Growing evidence has indicated that physical exercise is an effective alternative treatment for WMSDs (Rodrigues et al., 2014). Self-myofascial release (SMR) with foam rollers is becoming increasingly popular for treating musculoskeletal immobility and pain in athletes by relaxing contracted muscles (Schroeder & Best, 2015). Foam rolling is a novel therapeutic approach promoted by physical therapists and sports professionals that allows individuals to use their body weight to apply pressure to muscle tissues with a dense foam roller (Kalichman & David, 2017). This practice improves blood and lymphatic circulation and stimulates the stretch reflex in muscles (MacDonald et al., 2014). Early research on foam roller exercises suggests that it can help improve an athlete’s range of motion and muscle performance, aid in recovery after exercise (Cheatham et al., 2015), and reduce post-exercise muscle soreness (Schroeder & Best, 2015).

Although foam rollers can be easily used by anyone to mitigate myofascial pain, hotel housekeepers who endured physical pain from their daily cleaning tasks know little about such applications. The purpose of this study is to assess the short-term effects of a foam roller exercise intervention on improving range of motion (the movement potential of a joint or a body part) in hotel

housekeepers. Specifically, this study aims to test if housekeepers who perform 30 minutes of foam roller exercises before work for six weeks will demonstrate increased range of motion in major body parts, including their necks, shoulders, elbows, wrists, hips, and knees, compared to a control group.

Methods

This study adopted a quasi-experimental approach to test the hypotheses. Two hotels located in western New York State, with equivalent hotel star rankings, service scales, housekeeping workloads (numbers of rooms to clean), and guestroom layouts, were selected as study sites. With the assistance of hotel management, the researchers recruited 20 housekeepers (10 from each hotel). During the six-week study period, a certified coach led a daily 30-minute foam-rolling group exercise at 8 a.m. (weekdays) and 9 a.m. (weekends) at the experimental site. One of our researchers—an expert in sports medicine and kinesiology—developed three sets of foam-rolling activities based on the sources of major work-related body pain identified by previous studies (Krause et al., 2005; Hsieh et al., 2016). These three sets of foam roller exercises were rotated throughout the 6-week experimental period to ensure that all target areas received treatment. The foam rollers used for this study were 24-inch high-density foam rollers with a smooth surface. We purposely chose this type for its increased affordability compared with multilevel or GRID surface foam rollers. The duration of the study was set as six weeks because previous studies revealed significant changes in dorsiflexion range of motion following six weeks of the foam roller exercises (Aune et al., 2018; Hayes et al., 2012; Smith et al., 2019).

Housekeepers in the comparison group did not complete any exercises but did participate in the range of motion measurements. All participants were instructed to maintain their normal lifestyle routines during the study period. A trained examiner used a goniometer to measure range of motion (in degrees) for all participants before and after the study. The examiner was asked to perform the range-of-motion test on 10 randomly selected subjects twice, with measurements taken one week apart to ensure inter-rater reliability. The measurements were consistent, as inter-rater reliability was $ICC_{2,1} = 0.88$ to 0.99 .

Paired *t*-tests were utilized to determine any changes in the two groups in terms of their range of motion after six weeks. Independent-sample *t*-tests examined the pretest differences in range of motion between the two groups. In-depth interviews of the experimental group participants were conducted at the end of the study to better understand their thoughts regarding the morning foam roller group exercises. The examiner asked the participants what changes they had noticed in themselves (e.g., muscle pain, energy levels) and solicited their feedback regarding their foam roller exercise experience.

Interview data were analyzed by following the six steps of the thematic analysis recommended by Braun and Clarke (2006). The interview transcripts were read and then categorized using homologous wording by two trained coders, thereby producing two independent lists of initial codes. These initial code lists were compared, and inconsistencies between the two were resolved within the context of a group discussion, whereby a consensus was obtained. The two coders then grouped the codes into preliminary themes, which were then reviewed and modified to achieve coherence with the underlying codes.

Results

During the six-week study involving 20 participants, eight withdrew due to job termination or personal health reasons (e.g., pregnancy). Five participants remained in the experimental group and seven in the comparison group.

PARTICIPANT PROFILES

The experimental group was comprised of one male and four female housekeepers. Their ages ranged between 21 and 64, with an average age of 41, an average height of 5 feet 2 inches, and an average weight of 150 pounds. Their body mass indexes (BMIs) ranged between 19.3 and 38.7, with an average of 26.7. The comparison group consisted of seven female housekeepers. Their ages ranged between 32 and 65, with an average age of 46, an average height of 5 feet 1 inch, and an average weight of 156 pounds. Their body mass indexes ranged between 20.4 and 42.5, with an average of 31.5. None of the participants had requested three consecutive sick days off due to a musculoskeletal disorder or pain during the six weeks preceding the study. The results of the independent-samples *t*-test indicated that these two groups did not differ significantly at the $p < .05$ level in terms of their age, weight, height, and BMI. Table 1 presents these participant profiles.

Table 1: Participant Profiles

Participant	Gender	Age	Weight (pounds)	Height	BMI
Group 1 (exercise group)					
1	F	33	240	5'6	38.7
2	F	25	165	5'1	31.2
3	F	60	108	4'8	24.2
4	F	64	110	5'2	20.1
5	M	21	127	5'8	19.3
Average (SD)		40.6 (20.06)	150 (55.27)	5'2 (0.4)	26.7 (8.20)

(Continued)

Table 1: Continued

Group 2 (control group)					
6	F	38	139.2	4'	42.5
7	F	58	180	5'5	30.0
8	F	40	201	5'8	30.6
9	F	65	101	4'	30.8
10	F	42	217.6	5'	42.5
11	F	32	115	5'3	20.4
12	F	47	136.2	5'4	23.4
Average (SD)		46 (11.68)	155.7 (44.3)	5'1(0.7)	31.5 (8.51)

RANGE OF MOTION

Within-group analyses revealed significant range of motion improvements within the exercise group after six weeks of morning group foam roller exercises. Specific improvements included right hip abduction (before exercise: M = 27.6, SD = 8.0; after exercise: M = 40.4, SD = 7.1; $t(4) = -2.99, p = 0.040$), right shoulder adduction (before: M = 17.2, SD = 3.6; after: M = 28.4, SD = 4.2; $t(4) = -6.04, p = 0.004$), and right wrist radial (before: M = 24.2, SD = 6.7; after: M = 32.8, SD = 9.0; $t(4) = -3.28, p = 0.030$). No statistically significant range of motion changes were found within the non-exercise group at the end of the study (at $p = 0.05$ level). There were also no significant pretest differences in range of motion between the experimental and control groups.

Table 2: Results of Range of Motion

ROM	Pretest (Mean ± SD)	Posttest (Mean ± SD)	p-value
Group 1 (exercise group)			
Neck lateral banding (°)	44.0±14.2 [†]	43.4±11.0	0.957
Hip adduction (°)	26.6±7.2 [†]	27.4±6.2	0.877
Hip abduction (°)	27.6±8.0 [†]	40.4±7.1	0.040*
Knee flexion (°)	116.0±32.2 [†]	130.6±10.3	0.226
Shoulder abduction (°)	144.4±24.6 [†]	163.4±8.2	0.071
Shoulder adduction (°)	17.2±3.6 [†]	28.4±4.2	0.004*
Elbow flexion (°)	133.4±11.1 [†]	142.6±6.9	0.306
Wrist radial flexion (°)	24.2±6.7 [†]	32.8±9.0	0.030*
Wrist ulnar flexion (°)	40.6±11.5 [†]	37.0±6.0	0.374

(Continued)

Table 2: Continued

Group 2 (control group)			
Neck lateral banding (°)	36.7±9.1	33.9±4.9	0.555
Hip adduction (°)	23.6±4.5	27.0±4.7	0.183
Hip abduction (°)	37.3±14.6	36.4±12.1	0.900
Knee flexion (°)	126.0±28.8	123.4±11.7	0.754
Shoulder abduction (°)	140.3±24.3	149.0±20.1	0.191
Shoulder adduction (°)	21.9±6.6	24.4±3.8	0.390
Elbow flexion (°)	141.9±8.7	136.7±4.6	0.101
Wrist radial flexion (°)	26.7±9.6	30.6±6.6	0.412
Wrist ulnar flexion (°)	34.3±10.2	39.1±11.1	0.431

[†]No significant pretest differences between groups

*P < 0.05 indicates significant differences before and after 6 weeks of intervention

° indicates the degree of Range of Motion

EXPERIMENTAL GROUP INTERVIEWS

The following three themes were derived from the interview data: physical changes, psychological changes, and more team-oriented.

Physical Changes

One-on-one interviews at the end of the study were conducted to elicit descriptions by the exercise participants of their exercise experiences and any comments they had. Participants were asked what, if any, were the changes they noticed in themselves after six weeks of performing foam roller exercises. Physically, following the exercises, they noticed less body pain, looser muscles, a more relaxed body, and an improved ability to move. One commented, “I felt stronger after participating in the program. My shoulders feel better.” Two interviewees reported that they used to see their doctors for back pain prior to participation in the study, with one of them stating, “Since I participating [sic] in the study, my back pain diminished, and I have not visited my doctor for back pain since we started the morning foam roller exercise. It was amazing!”

Psychological Changes

Phrases the participants used to describe psychological changes they experienced after participating in the foam rolling exercises included feeling good, happier, more motivated to work, more energetic, and less tense. One stated, “The biggest difference before and after was that when I started the day with

foam rolling, I could do more work that day and felt less tired at the end of the workday.”

Participants were also asked to rank their energy levels on workdays starting with or without the foam roller exercises. They reported an increase in average energy levels from 4.2 (without foam roller exercise) to 8.6 (with foam roller exercise), based on a 10-point Likert scale where 1 = *dead tired* and 10 = *full of energy*. This indicated that participants experienced a boost in their energy levels after participating in daily foam roller exercises.

More Team-Oriented

Participants also noted that they had developed a stronger bond with their coworkers during the study. One said, “I enjoyed the free chat during the exercise every morning.” Another added, “I got to know my coworkers more because of this exercise.”

ADDITIONAL COMMENTS

When participants were asked if they had any additional comments regarding the study, one responded, “When I first came to the session, I did not believe this would help me, but it did. Every morning I could not wait to come to work to do the foam roller exercise.” Another added, “I saw the foam roller in the store all the time, but I had no idea what they were for. I am so glad that through the program, I learned how to use it, and it was very helpful.”

Before the end of the interview, all of the participants wanted to make sure that they could keep a foam roller with them to continue exercising by themselves at home. At the end of the interview, all participants expressed their appreciation for being able to participate in the study. One commented, “I am going to miss the exercise when coming every day.”

Discussion

Previous studies on the impact of foam roller exercises mainly focused on college students and athletes. In general, these studies found that foam roller exercises positively affected range of motion in the ankle (De Souza et al., 2017; Yoshimura et al., 2020), knee (Cheatham & Stull, 2019; Nehring et al., 2021), and hip (De Souza et al., 2017). They also reduced anterior knee pain, increased the mobility of the thoracolumbar fascia (Griefahn et al., 2016), and improved hamstring flexibility (De Bruyne et al., 2015). To our knowledge, this pilot study is the first experimental study exploring the application of group foam roller exercise sessions for improving occupational health. This exploratory study extended the known benefits of foam roller usage beyond previously studied populations to hotel housekeepers. It revealed that hotel housekeepers

experienced positive physical and psychological impacts from performing group foam roller exercises. Foam rollers can be used by hotel housekeepers as recovery and maintenance tools to increase their range of motion as well as to mitigate their body pain.

This study provided evidence that foam roller exercises may improve the range of motion of hotel housekeepers in three areas: hips, shoulders, and wrists. Notably, not all body parts necessarily benefited. In the course of their work, housekeepers are required to change sheets and towels; make beds; empty wastebaskets; dust and polish furniture and equipment; scrub sinks, taps, toilets, and bathtubs; wash and mop bathroom floors; vacuum floors; replenish supplies; push heavy supply carts; and respond to requests from guests and front desk employees. Kraus et al. (2002) studied 770 housekeepers in Las Vegas hotels and found that more than 80% of respondents reported mild to severe pain in their back, shoulders, feet/ankles, legs, and hands/wrists. Cleaning activities indeed involve heavy usage of wrists, hips, and shoulders, and these areas may therefore be more sensitive to foam roller exercises and be more likely to show positive responses for hotel housekeepers.

The qualitative information gleaned from interviews with the housekeepers who exercised reinforces the positive impact of group foam roller exercise sessions both physically and psychologically. Housekeepers participating in the exercises indicated that they felt happier and more energetic. Studies have documented the important role of physical exercise in boosting the mood of an individual (Annesi et al., 2017; Reed & Ones, 2006) and in enhancing their mental health (Appelqvist-Schmidlechner et al., 2020; Chekroud & Trugerman, 2019). The positive effects of the foam roller exercises among the exercising housekeepers in this study were consistent with the literature. Notably, group exercise sessions such as these also enhance social support and team cohesiveness and may increase employee relationships and job satisfaction (Dawson et al., 2008; Mehra et al., 2016).

Conclusion

This exploratory study can serve as a pioneer to focus researchers' attention on finding solutions that alleviate hotel housekeepers' work-induced body pain. Foam rollers are user-friendly and cost-effective (\$10 to \$20, depending on the size) recovery tools that can be used by hotel housekeepers to perform exercises at their own convenience. Other tourism workers, who have physically demanding jobs, can perform the foam roller exercise to further improve their health, well-being, and quality of life.

Foam-roller participants' additional comments reflect how much they appreciated the benefits of foam roller exercise and how such morning

group exercise became a motivation for the housekeepers to come to work. Researchers found social support at workplaces is associated with improved health, decreased psychological symptoms, reduced occupational stress, and less job turnover (Karatepe, 2013; Nahum-Shani et al., 2011). Due to the nature of independent cleaning work, hotel housekeepers often have no opportunity to interact with their coworkers; such interaction is an important form of social support (Burgel et al., 2010). The offering of group exercise can create a venue for housekeepers to foster positive relationships with their coworkers and provide assistance to each other. Hotel employers who would like to enhance teamwork should consider incorporating a morning foam roller exercise program to help prepare housekeepers to start their workday. The offering of group exercise, as seen in this study, can be used to demonstrate employers care and their commitment to their employees' wellness.

LIMITATIONS AND FUTURE STUDIES

Unlike laboratory experiments, which offer a high degree of control, this study was conducted in a real-world setting and had less control of extraneous variables. Even though these two hotels were similar in their hotel ranking, size of guest rooms, and housekeeping workload, there may be extraneous variables (e.g., company culture, management style) that might impact participants' daily work. As only a small number of housekeepers were employed at the participating hotels, it was not possible to form the experimental and control groups randomly from those employed at the one site. The small sample size also limits the generalization of the study findings. Future studies should seek out one hotel large enough to form a study site group randomly. This would minimize selection bias and help to distribute confounding variables equally between experimental and control groups. During the experimental study, the number of participants was reduced from 20 to 12 because of the unexpected drop-out of participants arising from job termination, department change, or personal issues. The decrease of the sample size places a potential limitation on the statistical power of the study. Future studies can duplicate this pilot study with a larger sample size. Cheatham and Stull (2019) found that GRID and multilevel surface foam rollers had greater immediate post-intervention effects on healthy and active adults. Future studies can adopt GRID surface foam rollers and test their intervention effects on hotel housekeepers' range of motion. Given the scope of this exploratory study, we limited our investigation to the impact of foam roller exercises on the physical health of the housekeepers. Future studies can adopt a longitudinal approach to extend the current study by investigating the impact of foam roller exercises on the psychosocial health of hotel housekeepers and absenteeism, employee morale, productivity, and workplace injury compensation.

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