Effect of Applying Different Relaxation Techniques on Older Adults' Caregivers' Burnout and Burden in Assisted Living Facilities

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Abstract

Aim: The aim of this study was to evaluate the effect of applying different relaxation techniques on older adults' caregivers' burnout and burden in assisted living facilities. ***Methods*:** A cohort of sixty caregivers recruited from two elderly homes (private and governmental) in Alexandria, Egypt were enrolled in this quasi-experimental study. The caregivers were conveniently selected and further randomly assigned to intervention (n=15) and control (n=15) groups in each home. Three instruments were used to collect the data, Maslach Burnout Inventory Scale, Caregiver Burden Inventory, and the Caregivers' Socio-demographic and Clinical Data Structured Interview Schedule. Relaxation techniques were administered to caregivers three times a week for four weeks. ***Results:*** A significant difference was shown in the mean total score of the Maslach Burnout Inventory post intervention (39.53±7.13, and 37.13±7.54) for the study groups, respectively, compared to pre intervention (20.93±8.17, and 14.40±6.73). The mean score of physical and emotional domains of the Caregiver Burden Inventory dropped significantly for the study group after intervention in both settings (P=<0.001, and 0.016) and (P=0.011, and <0.001) for physical and emotional domains, respectively. ***Conclusion:*** Relaxation techniques are effective in reducing burnout and some aspects of burden levels for caregivers. ***Recommendations**:* The study suggests that routine screening of caregivers' burden and burnout is crucial for early identification and management, thereby improving their quality of life. Furthermore, plan interventions to decrease caregiver burden and burnout as soon as caregiving commences.

Keywords: Caregiver Burnout, Caregiver Burden, Relaxation Techniques, Older Adults, Progressive Muscle Relaxation, Meditation

Introduction

It is agreed that caregivers are an integral part of the healthcare system. They can undertake a wide range of responsibilities, including assisting residents with daily activities and providing both physical and emotional support. These tasks can be of great importance for people with terminal illnesses or disabilities or for the elderly. Carrying out these duties can be quite exhausting and draining; this specifically applies to caregivers that take care of elders in assisted living facilities. Caregivers are prone to several mental illnesses, which can be caused by burnout or feeling of burden **(Sharif et al., 2020).** Numerous studies have shown that the prevalence of burnout and burden among caregivers in assisted living facilities has been increasing. **(Kunkle et al., 2020; Sharif et al., 2020; Yurt& Yavuz, 2022; Zaalberg et al., 2023).**

Burnout is a three-dimensional syndrome that includes mental depletion or emotional exhaustion, unfavorable thoughts and perceptions about one's coworkers or depersonalization and a decline in the sense of personal accomplishment that can occur among individuals who perform any type of human **(Adamopoulos & Syrou, 2023).** It can develop into a variety of mental issues, such as depression and anxiety and can have many negative impacts on quality of work. For instance, it can reduce career commitment and lower quality of performance. The higher the burnout, the more likely it is for one to hate their current occupation, which can shake their professional pursuit, thereby reducing the work input. For caregivers, this can be detrimental as any mishaps directly affect the residents, so there is no room for error. Evidently, many caregivers will find themselves in this position

at least once throughout their career as the stress of providing daily care to a struggling person can be overwhelming **(Egici et al., 2019).**

Another issue that greatly threatens a caregiver's performance and career is the feeling of burden. Caregiver burden is a complex, multi-dimensional concept that can be defined as the degree to which caregivers perceive their own physical, mental, social, and financial wellbeing considering the hardships associated with providing care for a chronically ill, disabled or elderly person **(Da Silva Marinho et al., 2022).** Caregiver burden can also be described as a sequence of negative responses that can arise when fulfilling the role of primary caregiver. It is extremely dangerous and can have many negative impacts on caregivers that include declining physical health comprising exhaustion, insomnia, weakened immune systems, and increased mental health concerns and overall decreased quality of life **(Liu et al., 2020).**

Despite how dangerous they are, burnout and burden are commonly ignored and undertreated. Apparently, this can lead to numerous issues for the caregivers when providing healthcare. Therefore, it is important to recognize these disorders, as well as their symptoms, and come up with suitable treatments and methods to overcome them. There are several ways for caregivers to relax themselves to reduce or prevent burnout and burden. The most important method, however, is the use of relaxation techniques **(Stephanou, 2023).**

Relaxation techniques are quite effective in decreasing burnout and feeling of burden. They are therapeutic exercises designed to assist individuals physically and psychologically by decreasing tension and anxiety. There are four main known relaxation techniques: visualization, meditation, breathing exercises and progressive muscle relaxation. Visualization is when one uses their five senses and their imagination to picture a realistic image and experience it. Meditation can be done by dedicating as little as 15 minutes a day to letting go of stressful thoughts. Breathing exercises can slow down breathing that induces relaxation. To use progressive muscle relaxation, continuous exercises and training should be done **(Toussaint et al., 2021).** Although these techniques might seem too simple to be influential, if done properly, they can be quite effective for decreasing burnout and burden, as well as other mental health problems for caregivers.

Significance of the study

The studies conducted so far have investigated the effect of relaxation techniques on variables such as stress, anxiety, depression, and fatigue, and there has been scarcity in studies that examined the impact of relaxation techniques on the caregivers' burnout and burden. On the other hand, the greater part of research has explored the effectiveness of relaxation techniques on caregivers of patients with specific conditions like stroke, and dementia and inconsistent results have been reported in some studies that have examined these techniques. Moreover, the majority of studies that have applied relaxation techniques in patients have methodological flaws, according to **Klainin-Yobas et al. (2015).**

Based on previous research findings, the effectiveness of relaxation techniques on caregivers is not convincing, and further research is required to examine the effect of the interventions on caregiver burden.

Aim of study

Study aimed to evaluate the effect of applying different relaxation techniques on older adults' caregivers' burnout and burden in assisted living facilities.

Research hypotheses:

H1: Older adults' caregivers who perform different relaxation techniques exhibit a lower level of burnout than those who do not.

H2: Older adults' caregivers who perform different relaxation techniques exhibit a lower level of burden than those who do not.

Operational definition of relaxation techniques in this study are visualization, meditation, breathing exercises and Progressive Muscle Relaxation exercise (PMR).

Materials and Method

Study design, setting, and participants:

The current study followed a quasi-experimental, non-equivalent control group pre- and post-test design where there were experimental and control groups. However, the participants were not allocated with randomization. Of the available elderly homes in Alexandria, two agreed to take part in this study namely, Dar Ahmos Khalifa and Dar El Hedaya. The first one is a private elderly home for both male and female elders, while the latter is a governmental facility for solely male elders. Both elderly homes are affiliated to the Ministry of Social Solidarity. After surveying the number of caregivers residing in these facilities, the researchers included all caregivers meeting the following criteria: aged 21 to less than 60 years; being formal caregiver for older adults for at least 6 months. The total sample size comprised 60 caregivers, after exclusion of the caregivers who refused to participate in the study (their number amounted to 7 caregivers). The final sample involved 30 caregivers (15 control & 15 study) coming from each elderly home. Participants were randomly assigned into control and study groups.

Study instruments:

The current study used three instruments for the purpose of data collection.

Tool I: Maslach Burnout Inventory Scale (MBIS)

It is a psychological assessment instrument comprising 22 items pertaining to occupational burnout. The original form of the MBIS was developed by Christina Maslach, 1986 (Maslach & Jackson, 1986). It gauges how often the three components of burnout syndrome namely, emotional exhaustion (9 items), depersonalization (5 items), and personal accomplishment (8 items). The frequency of each sub-scale was assessed using a seven-point scale, ranging from 0 (never) to 6 (everyday). The final score of each sub-scale was divided into "low, average, and high". The overall score was rated as follows: people with a high score for emotional exhaustion, depersonalization, and a low score on personal accomplishment had a high level of burnout. The average level of burnout was for people with an average score on the three sub-scales. A low level of burnout was reflected in people with a low score in emotional exhaustion, depersonalization, and a high score on personal accomplishment. This scale was translated into Arabic language and tested for validity and reliability in a previous study, and the Cronbach's alpha value was found to be 0.840 and the internal consistency coefficient was α=0.807 **(Ahmed, 2013).**

Tool II: Caregiver Burden Inventory (CBI)

This 24-item scale was created by Novak and Guest (1989) and aims to evaluate the effect of the burden on different facets of a caregiver's life, such as their function and wellbeing with five subscales: (a) Time Dependence; (b) Developmental; (c) Physical Burden; (d) Social Burden; (e) Emotional Burden. Briefly, time dependence subscale assesses stress resulting from the restriction of one's personal time owing to caregiving responsibilities, whereas developmental burden characterizes a feeling of falling short of peers in terms of development. Physical burden describes the effect on caregivers' physical health, strength, and vitality, whereas social burden refers to feelings of role conflict over one's family or employment. Lastly, emotional burden is a representation of negative feelings, embarrassment or feeling of shame caused by the patient. Items are scored on five-point Likert format that range from 0 (not at all descriptive) to 4 (very descriptive), resulting in a total score of 0–96. Higher CBI scores are indicative of greater perceived caregiver burden. This scale was translated into Arabic language to be used in this study and tested for its validity and reliability. The scale showed good validity and reliability values as the Cronbach's alpha value was 0.81 and test–retest reliability over a 2-week period was 0.79.

Tool III: Caregivers' Socio-demographic and Clinical Data Structured Interview Schedule:

This instrument is comprised of two parts. Part one was concerned with caregivers' sociodemographic data and work-related data as caregivers' age, gender, educational level, marital status, number of children, daily working hours, work experience, and total number of hours spent for caregiving. Part two addressed information related to caregivers' health condition & lifestyle: as presence of chronic diseases, previous hospitalization, care recipient's functional

condition, smoking, daily sleep hours, fluid and caffeine intake, number of meals per day, and practice of exercise.

Data collection procedure

Before the actual conduction of the study, the researchers thoroughly reviewed the literature to come up with tool III and translated, tested for validity and reliability for tool II. A pilot study was carried out on six caregivers selected from Dar Ahmos Khalifa to assess the applicability, clarity and feasibility of the study instruments to be in the final form. To master the acquired skills for data collection, the researchers attended three-month training program on the application of different relaxation techniques; progressive muscle relaxation, visualization, and meditation in an accredited center namely "Farha Center of Psychological Counseling and Self Training" in Alexandria-Egypt. Initial screening for caregivers was done using Tool I **(MBIS)**, Tool II (**CBI)** to determine the eligibility of the caregivers. The researchers used to visit each elderly home 3 days a week during the caregivers' morning and evening shifts. To gather the essential information, each caregiver who participated in the study underwent an individual interview in an empty room in the elderly home to complete tool I, II, and III. The researchers collected data from the control group in the first visit to the elderly home then from the study group. In groups of about 4-5 caregivers, all relaxation techniques were employed three times a week for 4 weeks for the study group (12 sessions in total). It took roughly 30 minutes for each session. The 4 different relaxation techniques were demonstrated during the first 2 sessions, redemonstration of all the 4 techniques was done during the other 10 sessions.

Over a course of two sessions, the caregivers in the intervention group were taught how to perform relaxation techniques. In the first one a **deep breathing exercise**—was demonstrated by the researchers to the caregivers who then redemonstrated the exercise. In the same session **visualization** was introduced to caregivers. They were instructed to relax, choose a favorite color, and visualize it and to imagine the desired color slowly washing over their body while inhaling, and imagining negative feelings leaving with each exhale. At the end of the first session, the caregiver was instructed to perform the techniques taught in the session, two times /day, until the time of the next session. At the beginning of the second session, the researchers redemonstrated the two techniques taught in the previous session with caregivers. In addition, two new relaxation techniques were administered: **Meditation** and **progressive muscle relaxation exercise.** Researchers instructed caregivers to close their eyes, visualize their feelings towards a loved one or pet, focusing on how they would like to convey them to this person. Further, they instructed to picture these feelings in the form of golden light that spreads from their heart. With each exhale, they imagine the golden light leaving and carrying feelings toward the other person. To perform the progressive muscle relaxation exercises, caregivers were instructed to intentionally tense the muscles in their hands, arms, neck, shoulders, face, chest, abdomen, hips, feet, and fingers (beginning with the hands and ending with the feet). Then, they asked to relax these muscles in the same order. Exercising the muscles of the right side for each group was done first and then the left side. To make sure the exercise was performed correctly, the researchers had let the caregivers redo the demonstration before the session was over. Moreover, a video was shown to the caregivers displaying how the PMR exercise is performed.

After completing the training, the researchers visited the caregivers three times per week for 4 weeks to redemonstrate the exercises with them. The caregivers were asked to practice these relaxation exercises during the time between each visit. After the study practice period was completed, the researchers evaluated the effect of the training through re-administration of the MBIS and CBI scales for study and control groups. Data was gathered from May to August 2022.

Ethical considerations:

After being fully informed about the study, including its objectives, title, names, and contact information of the researchers, each caregiver signed a consent form. Study subjects' privacy and anonymity were respected, and the confidentiality of the collected data was assured. The possibility to withdraw from the study at any time was guaranteed. The study was approved by the Ethical Committee Review Board of the Faculty of Nursing, Alexandria University, on March 13, 2022.

Statistical analysis of the data

Data was fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Qualitative variables were described using number and percentage, while mean and standard deviation were used to characterize quantitative ones. For the categorical data, a chi-squared test was employed to ascertain the difference between groups. The data normality was tested using the **Shapiro-Wilk** test. Since the data had normal distribution, Student's t-test was utilized for both dependent and independent samples. Comparisons of the two groups (control vs. study) were carried out using Paired t-test. Multivariate linear regression was done to detect the most independent/affecting factors affecting caregivers' burnout and burden. The results were judged significant at the 5% level.

Results

Table 1 shows the demographic characteristic of caregivers in Ahmous and El Hedaya elderly homes. One half (50%) of caregivers working in Ahmous and nearly three-quarters (73.3%) of those in El Hedaya aged 30–50 years old, and more than one-half (60%) of caregivers in Ahmous were female. The table also shows that more than one half (63.3%) of caregivers in El Hedaya were married, and the majority (80.0%) of them reported insufficient income. In terms of education, it was observed that the highest percentage of caregivers in Ahmous and El Hedaya (36.7%, and 46.7%, respectively) obtained university degree. The table clarifies that 73.3% of caregivers in El Hedaya had two or more children. Cardiovascular diseases were the foremost reported chronic condition by (63.6%, 54.5 %,) of caregivers in Ahmous and El Hedaya respectively.

Regarding the work-related data of the caregivers, the table depicts that 46.7% of caregivers in Ahmous and 80.0% of caregivers in El Hedaya have three years or more of experience in caregiving. As for the number of care receivers per each caregiver, the table shows a notable difference between the two settings, as most caregivers in Ahmous were responsible for care of 1-2 elders. On the other hand, more than one-half of caregivers in El Hedaya oversaw 5-6 elders. As for the daily working schedule, the entire cohort from El Hedaya worked for 8 hours daily and had one day off, compared to only 10% of those in Ahmous who worked eight hours a day and 90.0% had one day off. Roughly all (90.0%) of the caregivers in El Hedaya were responsible for caring for bedridden elders, and more than one half (60.0%) of caregivers in Ahmous are caregivers for partially dependent elders.

Table 2 displays the lifestyle behaviors of the study and control groups. From the table, it can be observed that more than one half (66.7%, 53.3%) of both groups do not practice any kind of exercise. More than three-quarters (76.7%) of El Hedaya caregivers sleep less than 6 hours per day. The table also illustrates that few percentages of caregivers in Ahmous and El Hedaya (10%, 3.3%, respectively) drink one & half liter or more of fluid per day, and the majority (70.0%, 80.0%, respectively) do not follow any therapeutic diet. The table also shows that the majority (96.7%) of caregivers in both groups drink stimulants. Smoking was reported by more than one quarter of El Hedaya caregivers. Most of El Hedaya caregivers (86.7%) do not follow a regular schedule for checkup, and all the caregivers take 2-3 meals per day.

Table 3 compares the study and control groups according to burnout scale scores pre- and post-intervention. The table reveals that there was a statistically significant difference between pre- and post-implementation of relaxation techniques in each group, as P= (0.006), and (0.002) for Ahmous and El Hedaya, respectively, in the emotional exhaustion dimension. The same is also applied to the depersonalization dimension, where the mean score of depersonalization significantly dropped after intervention in both residential facilities. This difference was statistically significant, whereas P= (0.001), (0.001). Regarding the personal accomplishment dimension, a significant increase in the mean score was found post-implementation of the relaxation techniques in each group. Specifically, the mean score for the Ahmous group increased from 20.93±8.17 to 39.53±7.13, and the mean score for El Hedaya increased from 14.40±6.73 to 37.13±7.54. The difference between the pre- and post- intervention was significant in both settings, P= (<0.001).

Table 4 shows Caregiver Burden Inventory scores pre and post implementation of relaxation techniques for the study and control groups. Statistically significant difference was found in the scores of caregiver burden between pre and

post intervention in physical and emotional domains for Ahmous caregivers. On the other hand, El Hedaya caregivers showed statistically significant difference in their scores pre and post implementation of the intervention in time dependent, developmental, physical, and emotional domains P= (0.001, 0.001, 0.016, and 0.001, respectively).

Table 5 represents the multivariate linear regression analysis for the parameters affecting caregivers' burnout and burden. It was found that presence of children is among the independent factors affecting caregivers' burnout and burden, since caregivers who have not children have a higher burnout and burden levels. Furthermore, caregivers' level of burnout is higher when they have limited income, making income another independent factor influencing caregiver burnout. The table also reveals that the most independent factors influencing caregivers' burden were age, number of care recipients, and number of working hours as increased age, number of care recipients and working hours are factors affecting burden level.

Table (1): Demographic and work-related data of the study and control groups (n=60)

Demographic and work-related data	Ahmous (Private) (n = 30)		El Hedaya (Governmental) (n = 30)	
	No.	%	No.	%
Age (years)				
<30	9	30.0	2	6.7
30-50	15	50.0	22	73.3
≥50	6	20.0	6	20.0
Sex				
Female	18	60.0	14	46.7
Male	12	40.0	16	53.3
Marital status				
Married	9	30.0	19	63.3
Widowed	3	10.0	4	13.3
Divorced	7	23.3	3	10.0
Single	11	36.7	4	13.3
Educational level				
Illiterate	2	6.7	8	26.7
Read and write	2	6.7	2	6.7
Primary	9	30.0	2	6.7
Secondary	6	20.0	4	13.3
University	11	36.7	14	46.7
Number of children				
No	13	43.3	4	13.3
One	3	10.0	4	13.3
≥2	14	46.7	22	73.3
Presence of chronic diseases #				
No	19	63.3	19	63.3
	(n = 11)		(n = 11)	
Cardiovascular diseases	7	63.6	6	54.5
Diabetes mellitus	1	9.1	2	18.2
Osteoporosis	2	18.2	3	27.3
Others	3	27.3	2	18.2
Medications taken				
No	19	63.3	19	63.3
Antihypertensives/ coronary vasodilators	5	16.7	5	16.7
Oral hypoglycemic drugs	2	6.7	2	6.7
Anticoagulants	1	3.3	0.0	0.0
Analgesics	2	6.7	3	10.0
Others	4	13.3	3	10.0

#: More than one answer was given

Table (1): Demographic and work-related data of the study and control groups "continued"(n=60)

Demographic and work-related data	Ahmous (Private) (n = 30)		El Hedaya (Governmental) (n = 30)	
	No.	%	No.	%
Previous hospitalization in the last year				
No	16	53.3	12	40.0
Once	6	20.0	8	26.7
Twice	6	20.0	4	13.3
≥3	2	6.7	6	20.0
Years of experience				
<1	8	26.7	1	3.3
1-3	8	26.7	5	16.7
>3	14	46.7	24	80.0
Income				
Not enough	9	30.0	24	80.0
Enough	9	30.0	2	6.7
Enough to some extent	12	40.0	4	13.3
Additional work beside caregiving				
Yes	7	23.3	3	10.0
No	23	76.7	27	90.0
Number of care recipients responsible to care for in the elderly home				
1-2	29	96.7	4	13.3
3-4	1	3.3	10	33.3
5-6	0	0.0	16	53.3
Number of daily working hours				
8	3	10.0	30	100.0
12	10	33.3	0	0.0
14	17	56.7	0	0.0
Number of off-days per week				
1	27	90.0	30	100.0
2	3	10.0	0	0.0
Health condition of the care recipients				
Independent	0	0.0	3	10.0
Partially dependent	18	60.0	3	10.0
Bedridden	6	20.0	27	90.0
Have cognitive problems (e.g., Alzheimer's disease)	7	20.0	0	0.0

#: More than one answer was given

Table (2): Lifestyle behaviors of the study and control groups (n=60)

Lifestyle behaviors	Ahmous (Private) (n = 30)		El Hedaya (Governmental) (n = 30)	
	No.	%	No.	%
Practice of exercise				
No	20	66.7	16	53.3
Walking exercises	6	20.0	11	36.7
Strengthening exercises	4	13.3	3	10.0
Hours of sleep				
Less than 6 hours	9	30.0	23	76.7
From 6 to 8 hours	15	50.0	5	16.7
More than 8 hours	6	20.0	2	6.7
Amount of fluid taken per day				
<1 litter	16	53.3	17	56.7
From 1 liter to less than 1.5 liters	11	36.7	12	40.0
≥1.5 litters	3	10.0	1	3.3
Following therapeutic diet				
No	21	70.0	24	80.0
Yes	9	30.0	6	20.0
Consumption of stimulants (e.g., tea, coffee, etc.)				
No	1	3.3	1	3.3
Yes	29	96.7	29	96.7
Number of cups per day				
1-2	16	53.3	5	16.7
3-4	11	36.7	14	46.7
≥4	3	10.0	11	36.7
Smoking				
No	28	93.3	22	73.3
Yes	2	6.7	8	26.7
Performance of regular checkup				
No	15	50.0	26	86.7
Yes	15	50.0	4	13.3
Number of meals per day				
1	2	6.7	0	0.0
2–3	25	83.3	30	100.0
>3	3	10.0	0	0.0

Table (3): Comparison between the study and control groups according to scores of the Maslach Burnout Inventory Scale pre and post intervention (n=60)

	Ahmous (Private)(n = 30)					El Hedaya (Governmental)(n = 30)					
	Control (n = 15)		Study (n = 15)		(t) p_1	Control (n = 15)		Study (n = 15)		(t) p_1	(t) p_2
	Pre	Post	Pre	Post		Pre	Post	Pre	Post		
Emotional exhaustion											
Total Score (0 – 54)											
Mean ± SD.	26.33±11.47	27.67±11.65	25.07±10.93	15.73±12.36	2.721* (0.011*)	26.93±8.61	28.93±11.93	30.47±15.22	16.27±9.78	3.180* (0.004*)	0.131 (0.897)
% Score	48.77±21.24	51.23±21.57	46.42±20.24	29.14±22.89		49.88±15.94	53.58±22.09	56.42±28.18	30.12±18.11		
(t_0) p_0	0.534(0.602)		3.269*(0.006*)			0.612(0.550)		3.787* (0.002*)			
Depersonalization											
Total Score (0 – 30)											
Mean ± SD.	15.87±2.92	15.67±2.72	17.47±4.88	11.93±1.67	4.536* (<0.001*)	15.40±2.56	15.73±2.05	17.80±3.67	12.13±2.29	4.529* (<0.001*)	0.273 (0.787)
% Score	52.89±9.75	52.22±9.06	58.22±16.27	39.78±5.56		51.33±8.53	52.44±6.84	59.33±12.23	40.44±7.65		
(t_0) p_0	0.201(0.844)		4.300* (0.001*)			0.351(0.731)		4.949* (<0.001*)			
Personal accomplishment											
Total Score (0 – 48)											
Mean ± SD.	19.87±6.51	19.33±8.65	20.93±8.17	39.53±7.13	6.980* (<0.001*)	16.93±7.22	16.53±9.36	14.40±6.73	37.13±7.54	6.637* (<0.001*)	0.896 (0.378)
% Score	41.39±13.57	40.28±18.02	43.61±17.02	82.36±14.85		35.28±15.03	34.44±19.51	30.0±14.02	77.36±15.70		
(t_0) p_0	0.181(0.859)		6.577* (<0.001*)			0.133(0.896)		8.631* (<0.001*)			

t_0: Paired t-test **t: Student t-test**

p_0: p value for comparing between **pre** and **post** in each group

p_1: p value for comparing between **Control** and **Study** in **post** period in each living facilities

p_2: p value for comparing between **Ahmous** and **El Hedaya** in **post** study group

Table (4): Comparison between the study and control groups according to scores of the Caregiver Burden Inventory pre and post intervention (n=60)

Caregiver Burden Inventory	Ahmous (Private) (n = 30)					El Hedaya (Governmental) (n = 30)					
	Control (n = 15)		Study (n = 15)		(t) p_1	Control (n = 15)		Study (n = 15)		(t) p_1	(t) p_2
	Pre	Post	Pre	Post		Pre	Post	Pre	Post		
Time dependent (0 – 20)											
Total Score	12.53±2.70	12.33±2.50	12.40±2.67	11.33±2.30	1.140	12.53±2.13	12.73±2.12	12.87±2.75	7.80±1.26	7.739*	5.213*
% Score	62.67±13.48	61.67±12.49	62.0±13.34	56.67±13.2	(0.263)	62.67±10.67	63.67±10.60	64.33±13.74	39.0±6.32	(<0.001*)	(<0.001*)
(t_0) p_0	0.345 (0.735)		1.87 (0.082)			0.526 (0.607)		6.517*(<0.001*)			
Developmental (0 – 20)											
Total Score	7.67±4.64	7.60±3.16	8.27±3.15	7.70±3.0	0.507	7.80±4.35	8.07±3.47	7.93±2.19	4.07±1.71	4.001*	4.071*
% Score	38.33±23.20	38.0±15.79	41.33±15.75	38.7±15.2	(0.615)	39.00±21.73	40.33±17.37	39.67±10.93	20.33±8.55	(0.001*)	(0.001*)
(t_0) p_0	0.088 (0.931)		0.303(0.767)			0.184 (0.857)		5.915*(<0.001*)			
Physical (0 – 16)											
Total Score	9.93±3.95	9.80±3.41	10.40±4.60	3.93±1.39	6.179*	9.80±3.59	9.73±2.81	10.00±5.18	5.13±3.18	4.194*	1.339
% Score	62.08±24.72	61.25±21.29	65.0±28.72	24.58±8.67	(<0.001*)	61.25±22.44	60.83±17.59	62.50±32.39	32.08±19.89	(<0.001*)	(0.196)
(t_0) p_0	0.121 (0.905)		5.815*(<0.001*)			0.052 (0.959)		2.742*(0.016*)			
Social (0 – 20)											
Total Score	9.20±3.59	9.27±3.43	9.73±2.34	8.10±3.06	0.986	9.73±3.03	9.93±3.90	9.67±2.85	8.93±3.13	0.781	0.743
% Score	46.0±17.95	46.33±17.16	48.67±11.72	40.5±5.41	(0.333)	48.67±15.17	49.67±19.50	48.33±14.23	44.65±13.07	(0.441)	(0.463)
(t_0) p_0	0.067 (0.948)		1.639 (0.112)			0.153 (0.881)		0.677 (0.503)			
Emotional (0 – 20)											
Total Score	8.53±2.83	8.67±1.40	8.33±3.29	4.67±2.89	4.819*	8.47±2.83	9.07±1.71	8.53±3.34	4.93±1.83	6.390*	0.302
% Score	42.67±14.13	43.33±6.99	41.67±16.44	23.33±14.47	(<0.001*)	42.33±14.13	45.33±8.55	42.67±16.68	24.67±9.15	(<0.001*)	(0.766)
(t_0) p_0	0.131 (0.898)		2.946*(0.011*)			0.668 (0.515)		4.513*(<0.001*)			
Overall(0 – 96)											
Total Score	47.87±8.99	47.67±4.65	49.13±5.13	31.1±5.12	9.279*	48.33±7.71	49.53±7.85	49.00±7.90	26.67±5.89	9.022*	2.220*
% Score	49.86±9.37	49.65±4.85	51.18±5.34	32.4±6.54	(<0.001*)	50.35±8.03	51.60±8.18	51.04±8.23	27.78±6.13	(<0.001*)	(0.036*)
(t_0) p_0	0.103 (0.920)		9.635*(<0.001*)			0.387 (0.705)		9.770*(<0.001*)			

t_0: Paired t-test **t: Student t-test**

p_0: p value for comparing between **pre** and **post** in each group

p_1: p value for comparing between **Control** and **Study** in **post** period in each living facilities

p_2: p value for comparing between **Ahmous** and **El Hedaya** in **post** study group

*: Statistically significant at $p \leq 0.05$

Table (5): Multivariate Linear regression analysis for the parameters affecting burnout and burden of caregivers (n=60)

	Burnout					Burden					
	B	OR	95% CI		P	B	95% CI		Beta	T	P
			LL	UL			LL	UL			
Age	1.005	2.731	0.450	16.586	0.275	4.423	0.898	7.948	0.359	2.530*	0.015*
Sex	-0.880	0.415	0.054	3.210	0.399	2.268	-2.180	6.716	0.148	1.028	0.310
Marital status	-0.247	0.781	0.328	1.859	0.576	-0.734	-2.737	1.269	-0.121	0.739	0.464
Presence of children	-2.502	0.082	0.012	0.560	0.011*	-3.411	-6.653	-0.169	-0.395	2.122*	0.040*
Additional job beside caregiving	0.324	1.383	0.149	12.864	0.776	-2.147	-6.565	2.271	-0.105	0.980	0.333
Income	1.510	4.525	1.187	17.257	0.027*	-0.811	-3.143	1.522	-0.091	0.701	0.487
Presence of chronic diseases	-1.340	0.262	0.044	1.562	0.141	-2.580	-6.749	1.589	-0.163	1.248	0.219
Number of care recipients	0.392	1.479	0.264	8.287	0.656	6.444	2.783	10.105	0.725	3.550*	0.001*
Number of daily working hours	0.053	1.055	0.879	1.266	0.566	0.555	0.185	0.926	0.505	3.026*	0.004*
Health condition of the care recipients											
Independent	-0.763	0.466	0.005	41.984	0.740	2.131	-7.746	12.007	0.140	0.435	0.666
Partially dependent	1.810	6.110	0.242	154.163	0.272	-1.108	-7.928	5.713	-0.058	0.327	0.745
Bedridden	2.144	8.532	0.482	151.015	0.144	-1.772	-7.126	3.583	-0.113	0.667	0.508
Has mental problems (Alzheimer's, etc..)	2.013	7.487	0.266	210.860	0.237	-5.206	-11.254	0.841	-0.322	1.736	0.090
Number of sleeping hours	0.542	1.719	0.526	5.623	0.370	0.197	-2.547	2.940	0.018	0.145	0.886
Number of meals per day	0.0	-	-	-	1.000	-5.146	-13.121	2.829	-0.194	1.301	0.200
Practice of exercise	-0.596	0.551	0.145	2.100	0.383	1.048	-1.729	3.825	0.095	0.761	0.451
	R^2 =0.547 , χ^2 = 33.747*,p <0.001*					R^2 =0.592 , F = 3.898*,p <0.001					

χ^2: Chi square for the model F,p: f and p values for the model R^2: Coefficient of determination B: Unstandardized Coefficients
Beta: Standardized Coefficients t: t-test of significance CI: Confidence interval

Discussion

The current study aim was to evaluate the effect of applying various relaxation techniques on reducing burnout and burden experienced by older adults' caregivers. Sixty older adults' caregivers were enrolled in the current study from two different settings. The study demonstrated a significant difference in posttest in caregivers' burnout and some aspects of caregiver burden between the study and control groups. Accordingly, the application of relaxation techniques had a meaningful impact on reducing the caregivers' burnout and to some extent the burden experienced by them. Hence, the study hypotheses were quietly supported.

Relaxation techniques can effectively alleviate the symptoms of burnout and burden by inducing physiological changes, such as decreased stress hormone levels and reduced sympathetic nervous system activation, which then translate into improved psychological and emotional well-being **(Pelekasis et al., 2016).** The findings of this study showed that application of relaxation techniques was effective in reducing the emotional exhaustion and depersonalization experienced by the caregivers, while also increasing their sense of personal accomplishment. This finding aligns with the results reported by **Yaman and Büyükyılmaz (2021).** Their research found that the implementation of relaxation exercises led to a reduction in caregivers' perceived burden and various dimensions of burnout, including emotional exhaustion and depersonalization. Furthermore, the personal accomplishment score of the caregivers was observed to increase after engaging in the relaxation exercises. Moreover, **Kukihara et al. (2022),** revealed that the implementation of yoga and mindfulness meditation interventions among elderly care workers significantly reduced various dimensions of burnout. Specifically, these relaxation-based practices were found to alleviate emotional exhaustion symptoms, such as feelings of frustration, emotional depletion, and overexertion. Additionally, they were effective in mitigating depersonalization, while also enhancing caregivers' sense of personal accomplishment, including increased feelings of competence and achievement in their work.

According to the literature, respiratory exercises are safe complementary therapy for treating anxiety, stress, and some emotional disorders as reported by **Kow et al. (2018).** Concurring to research by **Manandhar and Pramanik (2019),** frequent deep breathing exercises can significantly enhance stress and mood in healthy adults. **Van Der Zwan et al. (2015)** discovered that breathing techniques improved adult psychological well-being and improved sleep quality while reducing anxiety, tension, and depressive symptoms. This finding could be justified by the well-established positive effects of various relaxation exercises on both the physiological and psychological states of caregivers. Stimulation of the parasympathetic nervous system induces a cascade of physiological changes, including a decrease in heart rate, respiratory rate, and blood pressure. The relaxed physiological state attained through these exercises reduces the tissues' demand for oxygen and decreases the levels of metabolic byproducts, such as lactic acid, as well as the stress hormone cortisol **(Szczepańska-Gieracha et al., 2020).**

The current research detected a statistically significant difference in the overall mean scores of caregiver burden between pre and post intervention and in some aspects of the scale like physical and emotional domains for caregivers in the private home. On the other hand, most of the scale domains were improved significantly after the interventions for caregivers working in the governmental home. These findings are consistent with a study conducted by **Barghbani et al. (2023),** which revealed that the implementation of the relaxation techniques led to a notable decline in the mean overall burden score within the study group, as compared to the control one. Furthermore, the independent t-test demonstrated statistically significant differences in the mean scores of the time-dependent, developmental, physical, social, and emotional care burden subscales between the two groups. **Likewise, Yilmaz et al. (2018), Khazaeili et al. (2019), and Ebrahimi and Adib-Hajbaghery (2022)** concluded that progressive muscle relaxation exercises and massage had significant effects on reducing the mean score of caregivers' burden as measured by Zarit Caregiver Burden Scale in the intervention group.

Contrary to our results, **Szczepańska-Gieracha et al. (2020)** pointed out that relaxation exercises did not significantly reduce the burden of caregivers of demented patients. This contradictory result could be attributed to the small sample size for the intervention group in our study (15 caregivers from each home). Moreover, in Szczepańska-Gieracha work, the caregivers received a short duration intervention (2 weeks only) and for the relaxation techniques to be effective for dementia caregivers, the duration should be longer. Finally, the results could potentially be affected due to using a different questionnaire with different scoring.

In our study, time related burden out of the five care burden dimensions, received a higher score than the other aspects. This finding is verified by other studies conducted on other caregivers of acute or chronic patients by **Braich et al. (2012) and Sheikhbardsiri et al. (2022)**. This dimension illustrates how much time caregivers spend caring for their care recipients each day. It also evaluates stress brought on by having one's personal time restricted because of caregiving obligations. In the current study, the caregivers in the private home did not experience significant change after intervention for this domain contrary to the caregivers in the governmental home. This could be explained due to array of factors, the caregivers in the private home have long daily working hours in comparison with the caregivers in the governmental one (56.7% of caregivers working 14 hours per day). Moreover, although they are responsible for a smaller number of care recipients, caregivers in Ahmous are required to provide total care for them, which would result in more stress for the caregivers. Further, our study pointed out that relaxation techniques have limited benefit for the social burden domain, the same rational mentioned above about long working hours can be applied for the caregivers' social life.

The multivariate linear regression model in the current study illustrated several independent factors associated with higher levels of caregiver burnout and burden. Unexpectedly and in contrast with other reports, our findings revealed that caregivers without children had higher levels of burnout and burden compared to those who have children. This finding is in agreement with **Mikolajczak and Roskam (2018)** study of caregiver burnout which revealed that, in comparison to caregivers who do not experience burnout, caregivers who do experience burnout are more emotionally distant from their children, more physically and mentally worn out, and feel more inadequate to provide the care that their children need. In addition, the logistic regression model analyzed by **Vaingankar et al. (2015)** in their study revealed that the risk of burden was 0.4 times lower for caregivers of older adults with dementia who had children than for those who did not. More research is needed in understanding the independent association of the existence of children with caregiving burden.

Another observation from our study is that caregivers with lower income experienced higher levels of burnout. This result seems logical; giving the explanation that lower income can decrease access to resources (e.g. medical, recreational, .etc.) and increase burnout. In line with the previous result, **Hooley et al, (2005)** reported that caregivers with lower income had higher caregiver burden using Zarit Caregiver Burden Scale. **Limpawattana et al. (2012)** confirmed that self-reported income had a negative relationship with caregiver burden scores. Conversely, **Schwartz et al. (2020)** illustrated that higher income levels were correlated positively with higher caregivers' burden scores.

The present study highlighted that longer working hours positively related with caregivers' burden, as caregivers who worked more hours experienced greater burden. This finding is in line with **Yilmaz et al. (2018),** who reported a positive linear and moderate correlation between caregivers' burden, and the duration of caregiving for older stroke patients. Specifically, the study found that caregivers in both the intervention and control groups experienced increasing total burden scores as the duration of their caregiving responsibilities extended ($p < 0.05$). This indicates that the longer the caregiving time, the higher the perceived burden level reported by the caregivers. In the same vein, **Limpawattana et al, (2013), Brinda et al, (2014), and Lu et al, (2015)** came to the conclusion that shorter caregiving hours were linked to lower levels of physical burden. Subsequently the caregiver's burden increased with the amount of time spent on supervision and ADL assistance.

Limitation of the study

The small sample size of caregivers was the main drawback of the current work. Therefore, it is important to interpret these findings cautiously.

Conclusions and Recommendation

In conclusion, this quasi-experimental study showed that the application of relaxation techniques was effective in reducing burnout and some aspects of burden for caregivers in governmental and private homes. The study further concluded that lack of children is one of the independent factors affecting caregivers' levels of burnout and burden. However, increasing age, the number of care recipients, and working hours were also the most independent factors determining the burden level of caregivers. The study recommends, evaluation of caregivers' burden and burnout as a crucial component of routine screening using valid and trustworthy instruments to guarantee early identification and appropriate management of these issues, thereby enhancing their quality of life. Caregivers' daily schedules should incorporate structured relaxion practices to lessen burnout and perceived burden, this may involve mindfulness exercises, deep breathing techniques, and guided visualization. Institutional policies ought to acknowledge the special difficulties that caregivers, particularly those without children, confront. This could entail setting up peer mentoring programs or support networks that offer both practical and emotional assistance. Future research studies should be done to examine the interventions that are distinctively different among the four relaxation techniques used to alleviate burden and burnout. Finaly, plan interventions to decrease the caregiver burden and burnout as soon as caregiving commences.

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