Effect of Nursing Interventions on the Severity of Orthostatic Hypotension among Older Adults Residing in Assisted Living Facilities

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Abstract

Orthostatic hypotension (OH) is a predominant insufficiently evaluated and treated problem among older people. In this context, it is important for the gerontological nurses to assess and manage OH to avoid its serious consequences. ***Objective:*** *Determine the effect of nursing interventions on the severity of orthostatic hypotension among older adults.* ***Settings:*** *Two assisted living facilities affiliated to the Ministry of Social Solidarity, Egypt were selected.* ***Subjects:*** *Forty older adults who were eligible for the study.* ***Tools:*** *Five tools were used: Saint Louis University Mental Status (SLUMS) Examination, Geriatric Depression Scale Short-Form (GDS-SF), Orthostatic Vital Signs Measurement Scale, Older Adults Socio–Demographic and Clinical Data Structured Interview Schedule, and Orthostatic Hypotension Grading Scale.* ***Results:*** *A statistical significant increase in standing blood pressure was found post interventions compared to pre interventions. As well as, a highly significant improvement of OH symptoms among older adults was declared.* ***Conclusion:*** *Nursing interventions resulted in a statistically significant increase in standing blood pressure and improved the OH symptoms among older adults.* ***Recommendations:*** *In-service health education program about OH has to be offered on regular basis to the nurses at the different assisted living facilities.*

<u>**Keywords:**</u> Nursing Interventions; Orthostatic Hypotension; Older Adults; Assisted Living Facilities.

Introduction

Orthostatic hypotension (OH) is a common syndrome among older adults; that is defined a reduction in systolic blood pressure (SBP) of 20 mmHg or diastolic blood pressure (DBP) of 10 mmHg within 3 minutes of standing. OH increases with age, due to a decrease in autonomic nervous system function. Treatment of OH is often challenging divided into non pharmacological and pharmacological approaches. The gerontological nurses play a key role assessing OH symptoms (syncope, dizziness, vision changes, and cognitive impairment), which may contribute to serious complications, maximizing safety; and providing conservative treatment as: adequate hydration, elevating the bed's head and educating about ways to avoid occurrence

(Nahyun, Jooyeon; Hyunjung; Deok& Hyunwook, 2020).

Operational definitions:

Assisted living facilities (AlFs): In this study, refer to a type of housing designed for people who need various levels of medical and personal care namely "elderly homes".

Nursing Interventions: It refers to three different procedures to reduce severity of OH and associated symptoms namely "Bolus of water, Physical counter maneuvers, and Supine leg exercise".

Aim of the Study

This study aims to determine the effect of nursing interventions on the severity of OH among older adults residing ALFs.

Research Hypothesis

Older adults residing in ALFs who receive the three proposed nursing interventions will represent lower score on the orthostatic hypotension grading scale than before.

Materials and Method

Materials

Design: A quasi-experimental research design was used.

Settings: The study was carried out in two ALFs namely Dar-El Hedaya and Dar–EL Mouwasah.

Subjects: A convenient sample of all older adults residing in the above mentioned settings at the time of the study, and fulfilling the researcher's inclusion criteria. Based on inclusion criteria, the eligible number of older adults for the study was forty.

Tools: In order to collect the necessary data, five tools were used:

Tool I: Saint Louis University Mental Status (SLUMS) Examination

This tool was developed by Tariq et al., in 2006 and used to identify older adults with cognitive impairment. Its score is 30-point assessing eleven cognitive domains. Scoring depended on the respondent's level of education; in case of "High school education", scores ranged from 1 to 30 and classified as follows; older adults scoring from1-20 were considered dementia, 21-26 mild neurocognitive disorder, and from 27 - 30 have normal response. While, if "less than high school education", scores ranged from 1-30 and classified as; older adults scoring 1-19 were considered dementia, from 20-24 mild neurocognitive disorder, and 25 - 30 normal response.

Moreover, the researcher added "illiterate respondents score" in which; older adults scoring from 1-18 have dementia, 19-23 mild neurocognitive disorder, and from 24-30 have normal response.

Tool II: Geriatric Depression Scale Short-Form (GDS-SF)

The GDS-SF was developed by Yesavage et al., in 1983 to assess depression and general well-being in the older adults. The respondent chose the best answer for each statement; either "Yes" and took score one (1) or "No" with a score zero (0) for how he/she has felt over the past week.

Tool III: Orthostatic Vital Signs Measurement Scale

It was developed by The Agency for Healthcare Research and Quality in 2013 to measure blood pressure, pulse rate and include questions related to symptoms for patients who were at risk for hypovolemia, or had or near syncope symptoms, or at risk for falls.

The older adults was considered having OH when there was a drop of ≥20mm Hg in systolic or ≥10 mm Hg in diastolic blood pressure, or the pulse is increased of at least 30 beats/minute; after 3 minutes of standing.

Tool IV: Older Adults Socio–Demographic and Clinical Data Structured Interview Schedule

This tool was developed by the researcher based on in-depth review of recent relevant literatures to collect the socio-demographic and clinical data from the residence medical record.

Tool V: Orthostatic Hypotension Grading Scale

It was developed by Schrezenmaier et al., in 2005 to assess the frequency and severity of orthostatic symptoms, relationship of symptoms to orthostatic stressors, and impact of symptoms on activities of daily living and standing time. The items were scored on a 5 points Likert scale from (0) to (4). Scores for each item

were summed to provide a total score which classified as; older adults scoring 0 were considered to have no symptoms, those from 1 to 7 have mild symptoms, those from 8 to 14 have moderate symptoms, and those from 15 to 20 have severe symptoms.

Method

- The study was carried out in three phases:

I. Preparation phase:

- Where the researcher obtained the study approval from the responsible authorities, preparing the study tools to collect the necessary data, performing pilot study, and prepared the program education materials.

II. Implementation phase:

- The study subjects were interviewed individually by the researcher in the ALFs after explaining the study aim.

- The researcher implemented the proposed nursing interventions in 5 sessions. The first session the researcher screened all older adults to determine their eligibility for the study; in the second one the researcher gave the older adults simple information about OH.

- In the third, fourth and fifth sessions, the researcher implemented bolus of water drinking, standing cross legged and supine leg exercise interventions.

- Prior to the implementation of the interventions; the researcher asked the study older adults to refine from caffeine, nicotine and encouraged them to eat a light breakfast.

- Data collection started from the beginning of February to the end of April 2021.

III. Evaluation phase:

- The researcher evaluated the effect of the program nursing interventions two times as follow: The first evaluation was done immediately after implementing the proposed nursing interventions, and the second one was done after two weeks of implementing the last nursing intervention session by measuring the OH, the frequency and severity of orthostatic symptoms. Using tool III, and V.

Ethical considerations:

An informed written consent was obtained from each study subject after explanation of the study purpose. Study subject's privacy and confidentiality of the collected data was maintained.

Statistical Analysis

Data were analyzed using the statistical package for social science SPSS (version 20). The level of significance was ≤ 0.05 level.

Results

Table (1): regarding the age of the studied older adults, (80%) of the elders was sixty to less than seventy five years, and (20%) were seventy five to less than eighty five years. Regarding the older adults gender, the result revealed that; (52.5%) were males. Concerning the educational level, (25%) had basic education, (22.5%) were able to read and write, (20%) completed secondary education, (17.5%) had university education and above, while (15%) were illiterate.

Table (2) shows that the mean standing systolic blood pressure before the implementation of the three interventions were $(104.00\pm17.36, 108.75\pm15.22, 107.75\pm18.19)$ respectively. While, improved immediately after $(132.50\pm14.63, 123.00\pm15.72, 125.88\pm17.93,)$ respectively. There was a highly statistically significant difference between the standing SBP before and immediately after the implementation of the three intervention (P=0.000), and a statistically significant difference between the standing DBP before and immediately after the bolus of water drinking and supine leg exercise interventions (P=0.001, 0.023) respectively. Regarding the severity of OH associated symptoms before drinking bolus of water, the

table shows a highly statistically significant difference between the OH symptoms before and immediately after the implementation of the three interventions (P=0.000).

Table (3) shows that; the mean scores of the standing systolic and diastolic BP before and after two weeks of nursing interventions were (110.50±24.59, 69.75±14.05) and (119.25±11.63, 77.25±7.506) respectively. A statistically significant difference was noted between the standing SBP and DBP before and after two weeks of implementing nursing interventions (P=0.045, P=0.004) respectively. As for the laying blood pressure, no statistically significant difference between the laying SBP and DBP (P=0.949, 0.645) respectively before and after two weeks implementing the nursing interventions. A highly statistically significant difference was declared between OH symptoms before and after two weeks of nursing interventions (P=0.000).

Discussion

Orthostatic hypotension (OH) is associated with an increased risk of negative health consequences including cardiovascular diseases, falls, mortality, and cognitive impairment (Kim et al., 2020). However, the present study results revealed that; bolus of water intervention was effective in reducing OH and related symptoms (Table 2). This finding may be related to the fact that; drinking bolus of water expands plasma volume and elicits a significant pressor effect that increases the standing SBP. This is in line with other studies finding which reported that; drinking bolus of water increases standing BP which reduces the OH and its symptoms. (Newton& Frith., 2018; Frith, 2017). In contrast Senard et al, (1999) reported that; ingestion of 500 ml water did not change orthostatic BP when measured 60 min after fluid intake in patients with Parkinson's disease (PD) and neurogenic orthostatic hypotension.

In relation to the effect of standing cross legged intervention on OH and associated symptoms, the current study results showed; standing cross legged improved standing BP and associated OH symptoms (Table 2).This

finding may be explained by the fact that crossing one's legs while standing improves systemic venous return, resulting in increased heart rate and BP. This finding is supported by Kim, Choi, Won, & Kim, (2015) who revealed that; leg crossing effectively reduces OH without additional cost. Conversely, Newton & Frith, (2018) reported standing cross legged doesn't affect SBP drop neither OH symptoms.

Regarding the effect of supine leg exercise on OH and associated symptoms (Table 2), the present study finding revealed a highly statistically significant difference between the standing SBP before and immediately after the implementation of supine leg exercise intervention. This interpreted as; performing exercise minimizes venous pooling and expands plasma volume, thus exercise training may be beneficial to improve orthostatic symptoms. The findings are supported by Kanegusuku, et al., (2017). On the other hand; Zion, et al., (2004) reported that; a home based resistance training program using elastic bands effectively increases dynamic muscle strength in elderly with OH. With no changes in orthostatic BP, this could be attributed to the limited length of the program. In addition to the three interventions, there were some instructions included in the educational session and help in achieving the aim of the study (Table 3). These instructions included sleeping with the head up, decreasing the size of the meals and decreasing the amount of carbohydrates in meals, avoiding hot weather This result is in line with the findings of other studies done by (Cooper, &Hainsworth,2008; Son,& Lee ,2015; Stotz, et al ,2014).

Conclusion

The study hypothesis is supported by the findings of the present study, thus it can be concluded that; implementing the studied nursing interventions resulted in a statistically significant increase in standing BP and improved the OH symptoms among older adults.

Recommendations

- In-service health education programs about OH to be planned and offered on regular basis to the nurses at the different ALFS.

Table (1): Frequency distribution of the studied older adults according to their socio-demographic characteristics

Socio-demographic characteristics		Total (N= 40)	
		Frequency	Percent (%)
Age (years)	60- < 75	32	80.0
	≥75	8	20.0
Gender	Male	21	52.5
	Female	19	47.5
Marital status	Married	1	2.5
	Widowed	26	65.0
	Divorced	8	20.0
	Single	5	12.5
Level of education	Basic education	10	25.0
	Read & write	9	22.5
	Secondary education	8	20.0
	University education	7	17.5
	Illiterate	6	15.0
Work status	Skilled work	18	45.0
	Employee	12	30.0
	No work / house wife	10	25.0
Length of stay at elderly home (years)	< 5	26	65.0
	5< 10	10	25.0
	≥10	4	10.0
With whom live at elderly home	Alone	16	40.0
	One person	8	20.0
	Two persons and more	16	40.0

Table (2): Comparison of the mean orthostatic hypotention score and the severity of associated symptoms among the studied older adults before and immediately after drinking bolus of water

Items		Total (N= 40)														
		Bolus of water						standing cross legged						Supine leg exercise		
		Before		Immediately After		Test of Significance		Before		Immediately After		Test of Significance		Before		Immediatel y After		Test of Significance
		mean ± SD		mean ± SD				mean ± SD		mean ± SD				mean ± SD		mean ± SD		
Laying Blood Pressure	Systolic (mean ± SD)	126.00±17.51		126.00±17.51		NA		127.50 ±17.79		127.25 ±17.68		NA		126.75±19.13		126.75±19.13		NA
	Diastolic (mean ± SD)	76.75 ±9.711		76.75±9.711		NA		77.75 ±8.002		77.50 ±7.763		t = 0.142 P= 0.887		77.75±9.997		78.00 ±9.392		t = 0.115 P= 0.908
Standing Blood Pressure	Systolic (mean ± SD)	104.00±17.36		132.50±14.63		t = 7.939 P= 0.000*		108.75 ±15.22		123.00 ±15.72		t = 4.119 P= 0.000*		107.75±18.19		125.88±17.93		t = 4.489 P= 0.000*
	Diastolic (mean ± SD)	71.00±12.15		79.75±9.470		t = 3.592 P= 0.001*		71.25 ±10.42		75.13 ±7.720		t = 1.892 P= 0.0622		72.25±10.74		77.62 ±10.31		t = 2.281 P= 0.023*

Items		No.	%	No.	%	Test of Significance	No.	%	No.	%	Test of Significance	No.	%	No.	%	Test of Significance
Severity of orthostatic hypotension symptoms.	No	0	0.0	25	62.5	X^2 = 59.130 P= 0.000*	0	0.0	14	35.0	X^2 = 35.703 P= 0.000*	0	0.0	32	80.0	X2 = 58.296 P= 0.000*
	Mild	8	20.0	15	37.5		9	22.5	20	50.0		9	22.5	6	15.0	
	Moderate	13	32.5	0	0.0		19	47.5	5	12.5		21	52.5	2	5.0	
	Severe	13	32.5	0	0.0		10	25.0	1	2.5		9	22.5	0	0.0	
	Very sever	6	15.0	0	0.0		2	5.0	0	0.0		1	2.5	0	0.0	

X^2*: Chi Square Test*

T: Paired T Test

* Statistically significant at p ≤ 0.05

 # Multiple responses were allowed

NA: test of significance is not applicable

Table (3): Comparison of the mean orthostatic hypotention score and the severity of associated symptoms among the studied older adults before and after two weeks of nursing interventions implementation

Items		Before Mean ±SD	After 2 weeks Mean ±SD	Test of significance	Effect size Cohen's D
Laying Blood Pressure	SBP	127.75 ±21.78	127.50 ±11.49	t= 0.064 P= 0.949	0.014
	DBP	77.75 ±11.65	78.75 ±7.228	t= 0.461 P= 0.645	0.103
	HR	69.73 ±5.607	74.63 ±6.975	t= 3.463 P= 0.001*	0.774
Standing Blood Pressure	SBP	110.50 ±24.59	119.25 ±11.63	t= 2.034 P= 0.045*	0.455
	DBP	69.75 ±14.05	77.25 ±7.506	t= 2.978 P= 0.004*	0.666
	HR	75.70 ±6.136	80.40 ±6.071	t= 3.407 P= 0.001*	0.770
Systolic OH	Mean Difference between SBP lying and standing position	17.25±11.31	8.250±4.465	t= 4.681 P= 0.000*	1.046
Diastolic OH	Mean Difference between SBP lying and standing position	8.000±6.485	1.500±3.616	t= 5.537 P= 0.000*	1.238
Total severity of OH mean score		10.97 ±5.299	2.670 ±2.556	t= 8.923 P=0.000*	1.995

SBP: systolic blood pressure
DBP: diastolic blood pressure
HR: heart rate
OH: orthostatic hypotention

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