Effect of Nursing Intervention Guidelines on Elderly's Knowledge Regarding Protection from Heat Wave at the Main Assiut University Hospital

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Background: *The extreme heat can cause heat stress or heat stroke and poses dangerous effects on the brain and can end in death among elderly.* ***Aim:*** *To implement nursing intervention guidelines for the elderly's about protection from heat wave and evaluate its effect on elderly knowledge.* ***Subjects and method:*** *Quasi experimental research design was used. This study was conducted at chronic diseases outpatient clinics (diabetic clinic, internal medicine clinics, chest and cardiology clinics,) at the main Assiut University hospital.* ***Results****: Showed that (75.6%) and (78%) were illiterate and from rural areas respectively, (92.1%) of them did not know the health hazards of heat wave on elderly's health and (55%) of them did not know the measures to cool the body during heat stress before application of nursing guidelines and these percent reached zero after implementation of the nursing guidelines.* ***Conclusion:*** *There is improvement of the elderly's knowledge about protection from heat wave after application of nursing intervention guidelines regardless of the demographic data.* ***Recommendation:*** *Publication and dissemination of counseling program in all rural health units and primary health care centers to raise awareness of the elderly and their families regarding signs of heat stress, measures of protection from heat wave, health hazards of heat wave among elderly especially during summer months.*

Key words*: heat wave, heat stress, intervention guidelines, elderly.*

Introduction

Globally, the population is getting old quickly. Between 2015 and 2050, the percentage of the world's population over 60 years will nearly double, from (12%) to (22%) **WHO, (2016).** In Egypt, the proportion of elder people in 2006 was (7.2%), and nowadays the proportion of elder people in 2016 is (8.9%) and it expected to rise up to 10.9% in 2026, **Central Agency for Public Mobilization and Statistics , (2016)**

Most of the year, Egypt had average higher temperatures at times, greater than 100 degrees Fahrenheit. These severe climate condition changes can become risky, even deadly for elderly and could result in increased heat stress and higher rates of diseases such as skin cancers, infectious and vectorborne diseases. However, great settings can persevere and a heat wave can occur. A heat wave is an extended time of extreme heat, often 2-3 days long and endures through the night, **WHO, (2015)** and **Harmon, (2016)**.

Individuals experience symptoms throughout a heat wave include; vertigo, headache and fainting. In severe cases some individuals' expertise heat exhaustion or heat stroke. This happens when an individual stops sweeting and might result in loss of consciousness, this has dangerous effects on the brain and might cause death**, Black et al., (2013) and Harmon, (2016)**.

The regulation of body temperature involves several organ systems that naturally deteriorate with advanced age. This leaves the senior more at risk of heat hazards**, Blatteis, (2012)**.

Nitschke, et al., (2013) supposed that when elevated heat sustains for many repeated days, giving the body no time to regulate back to normal. Also, the elderly with presented unrelieved diseases are at even higher risk, because physiological impairments may already decline their capacity to deal with continued heat**.**

Heat wave happens when a high-pressure system within the atmosphere, rather than moving across the land, stays fixed in one location – for days or even weeks, **Kruszelnicki, (2017).**

People in danger to the adverse effects of high temperature, epidemiological studies have known the elderly, young children, people living alone, subjects with pre-existing chronic disease, **Zanobetti, et al., 2012) and Rockl, et al., (2014)**

The gerontological nurse stress on recognize the high risk group for heat-related disease. promote the use of caring measures, including air conditioning, fans, cold showers, move to cooler environments and escaping of exhausting activity in the heat, afford instruction for patients at risk and their caregivers regarding heat illnesses and their prevention, include a pre summer heat-related medical assessment into routine care plans for people with chronic diseases, during the meeting, provide suggestion about reducing heat exposure, ensuring adequate fluid intake, adjusting medication and other proper procedures, promote social contacts to help at-risk patients stay cool and well-hydrated **Kenny et al., (2010) and Farley, (2013).**

Significance of the study

Heat wave caused over 2000 deaths in 1998 in Odisha and quite 1200 deaths in 2002 in southern Asian country. More than 2400 people died in the heat wave of 2015. In Egypt, 92 citizens experienced heat-related fatigue and received medical attention. The most recent deaths include eleven who died in Cairo, whereas the rest of them from cities across Egypt. The most recent deaths come back daily when the Ministry of Health had proclaimed twenty one senior voters died and sixty nine were hospitalized when littered with heat connected incidents, under a high emissions scenario heat-related deaths in the elderly (65+ years) are projected to increase to approximately 47 deaths per 100,000 by 2080 compared to the estimated baseline of about one death per 100,000 annually between 1961 and 1990, **WHO, (2015)**

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Aim of the study

To implement nursing intervention guidelines for the elderly about protection from heat wave and evaluate its effect on elderly's knowledge.

Research hypotheses

- Elderly people may have low level of knowledge about protection from heat wave hazards.
- Elderly people may exhibit improvement in their knowledge regarding heat wave after implementation of the nursing guidelines.

Subjects and method

Research design:

Quasi experimental research design was used in this study.

Setting:

The current study carried out at the chronic outpatient clinics (diabetic clinic, internal medicine clinics, and chest and cardiology clinics) at the main Assiut University hospital.

Sample:

Convenient sample of 127 elderly patients aged 60 years and above recruited from previous setting in the summer months from first of June to end of September 2017).

Inclusion criteria

- Elderly patients aged 60 years and above.
- Alert and able to communicate.

Tool of the study:

Part (1):

- Included the demographic data: as name, age, gender, residence, marital status, level of education, occupation before retirement,
- Medical history such as: - diabetes mellitus, hypertension, heart disease, atrial fibrillation, respiratory disorder, dementia, urinary tract infection and kidney disease….etc.

Part (2):

This part integrated questions related to information about protection from heat wave as the meaning of heat wave**,** heat stress, the high risk group for heat related illness, the signs of heat stress**,** the measures to cool the body during heat stress, the health hazards of heat wave, …….etc.

Part (3):

Designed guidelines were deliberated by the researchers about heat wave after reviewing current national and international literature. It was designed as brochure that contained simple and brief instructions with pictures about signs of heat stress, measures to cool the body with Arabic language, health hazards of heat wave.

Scoring system:

Which included two scores (one and zero); one was given to correct answer and zero for the wrong answer. The total score of knowledge questionnaire was 50 degree.

Methods of teaching used in the program:

Methods of teaching that used in each group session included demonstration, lecture, group discussion.

Media used in the program:

Media that used in each group session included pictures, brochure, and posters.

Method:

Administrative phase

An official approval obtained from the manager of the outpatients clinics at the main Assiut University hospital to complete the study. The letter included a permission to carry out the study in the selected clinics, explained the purpose and nature of the study and oral permission from the elderly people was obtained for their vital assistance to conduct the study.

Content validity of the tool

It was checked by team of three expertise who reviewed the tool for its simplicity, relevance, comprehensiveness, understanding, applicability and easiness, minor modifications were required and correction was carried out accordingly**.**

Reliability was measured using Cronbach's Alpha Coefficients methods to ensure internal consistency and its results revealed that all statements of study questionnaire showed α were ≥ 0.85.

Pilot study:

A pilot study was conducted before preliminary data collection to assess sensitivity, specificity, clearness and applicability of the questionnaire and to do the necessary modification. Also to determine the time needed. It was carried out on 5% elderly persons from the previous settings. Analyses of the pilot study revealed that minimal modifications are required. These modifications were done and the subjects were excluded from the actual study.

Data collection:

After obtaining the official approval, data collected by using interview structured questionnaire. The study started in 1st of June to the end of Septemper 2017, The researcher collected data three days per week, 4 hours each day from 9 am to 1 pm and the average number which was interviewed was 3-4 elderly patients per day. The researchers were clear up the purpose and nature of the study to each elderly patient who agreed to share in the study prior to answering the questions, explained the nature and purpose of the designed nursing guidelines and fill out the questionnaire sheet. The approximate time spent was around from 20 to 30 minutes to fill the assessment sheet, the second 30 minutes the researchers given the designed nursing guidelines with attractive simple manner according to the patients' needs to ensure their understanding, each patient obtained a copy of the designed nursing guidelines brochure.

Study phases:

- Assessment phase: The researchers started a face to face person being interview with elderly, completed the sheet for all patients and wrote exactly the answers that the elderly persons given.

- Implementation phase: the researchers began to implement the designed guidelines for protection from heat wave hazard, this guidelines include definition of heat wave, heat

stress, signs of a heat stress, steps to cool the body during heat stress ,health hazards of heat waves, the best clothing for hot climate or a high temperature wave, and how can elderly protect their health when temperatures are extremely high and picture for preventing heat stroke.

- Evaluation phase: it had been done immediately after implementation of nursing intervention guidelines to investigate the effects of the intervention on elderly's knowledge.

Ethical considerations:

- Research suggestion was agreed from ethical committee in the Faculty of Nursing, Assiut University.
- There is no risk for study subjects during application of the research.
- The study followed common ethical principles in clinical research.
- Oral permission was obtained from elderly that are ready to join in the study after explaining the nature and purpose of the study.
- Confidentiality and anonymity was assured.
- Study subjects have the right to refuse to contribute or withdraw from the study without any rational at any time.
- Study subjects privacy was considered during collection of the data.

Statistical analysis:

The obtained data were reviewed, computerized and verified using the SPSS version 23 to perform tabulation and statistical analysis. Qualitative variables were described in frequency and percentages, statistical analysis of variance done by using chi-square test, significant was considered at P- value ≤0.05**,** Independent T- test was used

Results

Table (1): Distribution of the demographic characteristics of the studied sample: Represented that more than two thirds of the studied sample (68.5%) their ages ranged from 60 to 64 years with mean of age (**62.81±4.018**), while (74 %) of them were female. As regards educational level, it was observed that (75.6%) of the studied samples were illiterate and about three quarters (74%) of them were house wife and (78%) from rural area.

Table 2: Distribution of the studied sample as regard suffering from diseases and medication taken: Represented that (24.4%) of the studied sample suffer from both diabetes mellitus & hypertension, while (1.6%) of them suffer from kidney disease.

Table (3): Distribution of the studied samples as regard elderly's knowledge about protection from heat wave: showed that (37%) of the studied sample did not know meaning of heat wave in pretest. As regard health hazards of heat wave, about (92.1%) of the studied sample did not know that before application of nursing guidelines.

Table (4): Relationship between knowledge score of elderly about protection from heat wave and their demographic characteristics before and after nursing guidelines: there is a statistical significant difference between knowledge score and gender, marital status before and after application of nursing guidelines.

Table (1): Distribution of demographic characteristics of the studied sample

Variables	No=127	%
Age		
60-64	87	68.5%
65-69	29	22.8%
70 >	11	8.7%
Mean± SD	**62.81±4.018**	
Sex		
Male	33	26.0%
Female	94	74.0%
Marital Status		
Single	6	4.7%
Married	77	60.6%
Widow	44	34.7%
Level of education		
Illiterate	96	75.6%
Read and write	14	11.0%
Educated	17	13.4%
Work before retirement		
Not employed	101	79.5%
Employ	7	5.5%
Others job(private)	19	15%
Residence		
Rural	99	78.0%
Urban	28	22.0%

Table 2: Distribution of the studied sample as regard suffering from diseases and taking medication

Item	Elderly=127	%
Suffering from diseases		
Hypertension	33	26%
Diabetes mellitus	14	11%
Heart disease	3	2.4%
Thyroid disorders	8	6.3%
Osteoarthritis	36	28.3%
Kidney disease	2	1.6%
Diabetes mellitus & Hypertension	31	24.4%

Table 3: Distribution of the studied sample as regard elderly's knowledge about protection from heat wave.

Variables	Elderly information				P value
	Pre		Post		
	N=127	%	N=127	%	
Meaning of heat wave					
Yes	80	63%	127	100%	0.00
No	47	37%	0	0	
Meaning of heat stress					
Yes	76	59.8%	114	89.8%	0.00
No	51	40.2%	13	10.2%	
≠**The most vulnerable group to heat stress**					
Don't known	36	28.3%	0	0	0.00
elderly(60+)	58	45.7%	73	57.5%	
Patients with chronic diseases, especially heart and kidney disease, stress and diabetes	6	4.7%	89	54.3%	
Workers in furnaces, iron and steel plants	13	10.2%	57	70%	
Construction workers	14	11%	43	33.9%	
≠**The signs of** heat stress					
Do not know	94	74.0%	0	0	
Extreme sweating	13	10.2%	13	10.2%	0.00
Paleness	0	0	19	15%	
Muscle cramps	4	3.1%	24	18.9%	
Dizziness or loss of balance	0	0	12	9.4%	
Headache	3	2.4%	21	16.5%	
Others (Nausea or vomiting, fatigue, weakness, fainting, blurred vision)	13	10.2%	38	29.9%	
≠**Measures to cool the body during heat stress**					
Do not know	70	55.1%	0	0	
Drink cold water.	31	24.4%	58	45.7%	0.00
Stay at home	8	6.3%	15	11.8%	
Take a cool shower, bath	9	7.1%	28	22.0%	
Use of fan	31	24.4%	70	55.1	
Wear lightweight clothing	1	0.8%	9	7.1%	
All of the above	0	0.0%	58	45.7%	
≠**The health hazards of heat waves**					
Do not know	117	92.1%	0	0	0.00
Heat edema	8	6.3%	15	11.8%	
Muscle aches or cramps	12	9.4%	91	71.7%	
Heat exhaustion and / or heat stroke.	21	16.5%	31	24.4%	
Heat syncope	0	0	0	0	

≠More than one answer was allowed

Table (4) Relationship between knowledge score of elderly about protection from heat wave and their demographic characteristics before and after nursing guidelines

Demographic characteristics	N=127	Knowledge score about protection from heat wave	
		pretest	posttest
		Score Mean±SD	Score Mean±SD
age group			
60-64yrs	87	20.67±4.92	40.2±4.21
65-69yrs	29	23±4.7	40.14±2.79
70-and more	11	20.55±4.32	39.73±3.5
P. value		0.074	0.931
Gender			
Male	33	21.91±5.84	38.88±4.1
Female	94	20.94±4.51	40.59±3.68
P. value		0.327	**0.028***
marital status			
Single	6	20.4±4.34	47±5.15
Widow	44	21.36±4.76	39.64±2.88
Married	77	21.1±5.06	39.94±3.87
P. value		0.912	**<0.001****
level of education			
Illiterate	96	20.71±4.86	40.49±3.81
read and write	14	23.29±4.2	39.36±5.06
Educated	17	22.44±4.07	39.33±2.24
P. value		0.270	0.580
Occupation before retired			
Noworking	101	20.84±4.67	40.39±3.66
Worker	7	20.29±3.64	38.86±2.67
Private	19	23.37±5.95	39.32±5.03
P. value		0.103	0.359
resident			
Rural	99	21.05±4.9	40.13±3.53
Urban	28	21.68±4.89	40.18±4.88
P. value		0.550	0.955

Independent T- test *Statistically Significant difference At P.value<0.05
One way Anova **Statistically Significant difference At P.value<0.01

Discussion

In the summer time, heat variability might raise the risk of heat-related death for the elderly and other susceptible populations, contributing factors include homebound lifestyle, lack of contact with other people and decreased mobility, the physiological impairments in the regulation of core body temperature in hot conditions, **Hajat, et al, (2010) and Zanobetti, et al., (2012)**.

People with age over 60 years, obesity, hypertension, pulmonary or cardiovascular disease, or long-standing diabetes, a history of substance abuse, psychiatric illness such as schizophrenia or dementia, People using drugs or drinking alcohol heavily, The chronically ill and elderly who taking prescription medications (e.g., diuretics, anticholinergics, antipsychotics, and antihypertensives) which decrease the body's ability to adapt to changes in environmental conditions are at increased risk of heat-related illness as heat cramps, heat exhaustion and heatstroke during prolonged heat events, **Hajat, et al, (2010), Kenny et al., (2010) and Farley, (2013).**

In the present study, complaining from diseases that produce negative health effect about heat wave, more than one quarter of the studied sample suffering from hypertension and taken its medications as diuretics on a regular basis, this percent increased for more than half of the sample in the study of **Nitschke et al., (2013)** while more than half in the case group and (44.8%) from the control group had hypertension in **Vandentorren et al., (2006)**. In this study (11%) of them had diabetes only and reported by (16%) in **Nitschke et al., (2013)**, this may be explained by increased the prevalence of chronic diseases with advanced age.

As concern to heart diseases, **Vandentorren et al., (2006)** found that around three fifths from the case group and more than one third of control group had heart disease and presents in (2.4%) in this study, the decreased percent in this study may be related to decreased flow of heart disease patient as they seeking medical attentions in emergency situations only, the presence of these chronic diseases among the studied sample indicates that they are high risk to heat related morbidity.

Regarding their knowledge about the high risk group that affected by heat wave, more than one quarter of them did not know before application of the guidelines and this percent become zero after the application of the guidelines. Less than half of them reported that the older adult high risk for heat stress and increased to more than half of them after guidelines intervention. The patient with chronic disease reported by more than half of them after application of guidelines while reported just only by (4.7%) of them before that. The people who work in furnaces reported by (44.9%) after guidelines intervention, this means that the nursing guidelines proved its efficiency in improving the elderly's knowledge in this point.

Old people may be at increased risk for heat related morbidity due to inadequate fluid intake or neglect protective measures such as dressing lightly, using cooling techniques (taking extra showers/baths, visiting air conditioned places), increasing social contact and having home air-conditioning, tend to reduce the risk of death during a heat wave, **Grand, (2013).**

As regard to measures that cool the body during hot climate, more than half of the sample did not know these measures before application of the guidelines, this percent reach zero after implementation of the guidelines.

Concerning take a cool shower or bath to cool the body only (7.1%) do it while this stated by (22 %) of them after implementation of guidelines and more than one quarter in **Nitschke et al., (2013)**. This is agreed with **Vandentorren et al., (2006)** in which (20.8%) of the case group had a bath or shower and around one third of the control group (32%) stated that, as regard to wear light weight clothes, only one elderly reported this and raised to (7.1%)of them after implementation of guidelines, while in **Vandentorren et al., (2006)** more than half of the case group (51%) and less than three quarters (73%) from the control group stated that and the vast majority in **Nitschke et al., (2013),** this variation in the percent reflect the personal freedom in wearing clothes**.**

As regard to drink cold water reported by one quarter of the studied sample, it is raised to more than two fifth in the case group of **Vandentorren et al., (2006)** and represent (63.7%) in the control group, this is due to lack of knowledge regarding compensation of the body fluids during hot weather.

In **lane et al., (2013**) less than three quarters (71%) of the sample took some protective steps during hot weather as drinking water, wearing light clothes and going to a cooler place and no one in this study do these protective measures together, it shows the lack of knowledge regarding these steps in these studied sample.

Staying at home during heat wave reported by (6.3%) in this study while in **Nitschke et al., (2013)** stated by the vast majority, in our country that have a summer season in the year and weather changes, the citizens make their daily activities outside their homes and do not put the hot weather into their consideration.

Concerning the signs of high temperature around three quarters did not know these signs, (2.4%) reported headache and increased to (16.5%) after application of the guidelines while stated by (11.4%) in **Nitschke et al., (2013)**, felling dizzy or loss of balance not reported by anyone in this study, nearly one tenth in **Nitschke et al., (2013)**, the other signs as nausea, fatigue,…. reported by (10.2%) before guidelines and increased to (30%) after guidelines and increased this percent in **Nitschke et al., (2013),** it interpret as when the studied sample experience these signs, they consider a transient signs or they think that these signs related to their chronic conditions and not related to heat stress.

Physical stress of heat wave includes general heat edema, edema of hands, ankle and feet, heat rash which accompanied by acute inflammation and blocked of sweat ducts. Heat muscle cramps which occur after intense exertion. They usually develop in people performing heavy exercise while sweating profusely and replenishing fluid loss with non-electrolyte containing water. Heat syncope is related to heat exposure that produces orthostatic hypotension. Heat exhaustion is considered by experts to be the forerunner of heat stroke which is marked by excessive dehydration and electrolyte depletion, **Black,et al., (2013).**

Heat exhaustion may be presented by irritability, exhibit poor judgment, and experience headache, nausea, vomiting, diarrhea, intense thirst, vague malaise, and dizziness.

Other signs of trouble include tachycardia, tachypnea, dry mucous membranes, and low urine output, cool, clammy skin indicates shock, **Michael, (2010).**

Regarding their knowledge about the health hazards of heat wave, the vast majority of them did not know these hazards of heat wave before guidelines and reached zero percent after application of the guidelines. Heat stress reported by (16.5%) and increased to one quarter after guidelines and listed by (12%) in **Nitschke et al., (2013),** this means that they unaware of the subject hazards.

There are improvement in the elderly's knowledge after implementation of the nursing guidelines regardless of the demographic characteristics even the illiterate elderly that had mean score higher than the educated patients, there is a statistically significant differences between knowledge score and gender, marital status before and after application of nursing guidelines, it refers to the effect of the nursing guidelines.

In spite of improvement in the elderly's knowledge after implementation of the nursing guidelines, not all elderly patients had the highest score in each question regardless of the demographic characteristics, this may be due to the normal changes in the brain and impaired cognitive abilities of them regarding attention and recalling information.

Conclusion

Based on the results and research hypothesis of the present study, it can be concluded that: the nursing guidelines proved its efficiency in improving elderly's knowledge about protection of heat wave after application of nursing intervention guidelines.

Limitations of the study:

The most important limitations which facing the researchers during this study were the small sample size that prevent generalization of the results, there were a lot of knowledge gaps that need to be addressed in the study, another methodology to best assess the heat wave effect on morbidity and mortality, there were a very limited studies in other countries to examine the effect of heat wave hazards.

Recommendations: based on the results of the present study, the following recommendations are suggested:

- community health attention should be focused towards specific actions to reduce the health effects of heat wave among vulnerable subgroups especially the elderly, subjects with chronic disease.
- Raising public awareness especially who are in contact with the high risk group regarding protection from heat wave.
- Increase the community knowledge to follow the local news and climate channels or contact your local public health department during severe heat conditions for health and safety updates
- Publication and dissemination of counseling program in all rural health units and primary health care centers to raise awareness of the elderly and their families regarding signs of heat stress, measures of protection from heat wave, health hazards of heat wave especially during summer months
- Further studies should be carry out to explain more about the physical, psychological and sociological effect of heat wave.

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