JBACHS
Journal of Basic and Clinical Health Sciences

J Basic Clin Health Sci 2024; 8: 358-366
https://doi.org/10.30621/jbachs.1303019
RESEARCH ARTICLE

EXAMINING PATIENTS' USE OF GRADUATED COMPRESSION STOCKINGS IN POSTOPERATIVE PERIOD

Filiz Salman Saraç[1], Altun Baksi[1], Faruk Durna[2], Nida Nur Yurt[2]

[1] Suleyman Demirel University, Faculty of Health Sciences, Department of Surgical Nursing, Isparta, Turkey.
[2] Suleyman Demirel University, Faculty of Health Sciences, Department of Nursing, Isparta, Turkey.

ORCID: F.S. 0000-0003-2107-0545; A.B. 0000-0001-8267-2254; F.D. 0000-0002-9470-7386; N.N.Y. 0000-0002-2795-0810

Corresponding author: Filiz Salman Saraç, **E-mail:** filizslmn@gmail.com
Received: 26.05.2023; **Accepted:** 27.02.2024; **Available Online Date:** 31.05.2024

Cite this article as: Salman F, Baksi A, Durna F, Yurt NN. Examining Patients' Use of Graduated Compression Stockings in Postoperative Period. J Basic Clin Health Sci 2024; 8: 358-366.

ABSTRACT

Purpose: This study aimed to examine the use of graduated compression stockings in patients after surgery.
Methods: Employing a descriptive research design, the study was conducted on a sample of 173 postoperative patients using compression stockings in the surgical departments of a university hospital. The data, obtained through the sociodemographic and clinical characteristics form, and the evaluation form assessing the use and knowledge level of graduated compression stockings, were collected via face-to-face interviews and observation.
Results: The mean age of the patients in the study sample was 58.84±13.67 years, and the number of days after wearing graduated compression stockings was 2.97±2.14. Among all the patients, 80.9% did not elevate their feet while in bed before putting on stockings, and 72.3% did not wear stockings before getting out of bed. The researchers observed that 50.9% of the patients correctly positioned the stockings on the heel, while 79.2% had folds in the stockings they wore. Additionally, during the removal of stockings for observations, 59.5% of the patients exhibited redness in the corresponding area. The patients who received information from healthcare providers had used the stocking accurately, and there was less tissue damage ($p<0.05$).
Conclusion: Patients experience some problems during the use of stockings, such as incorrect usage and tissue damage; however, these problems are less observed in educated patients. Consequently, it is advisable to implement comprehensive and effective patient education programs on compression stocking usage to address these issues and improve patient outcomes.

Keywords: Graduated compression stockings, Nursing, Postoperative, Venous thromboembolism

INTRODUCTION

Venous Thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism, is a preventable and significant health issue, often occurring in the lower extremity venous vessels (1). Three basic mechanisms which facilitate the development of VTE and which are defined as the Virchow triad are slowing of blood flow, endothelial damage and hypercoagulation (2, 3). When the clot formed as a result of this mechanism moves to other parts of the body, potentially fatal consequences occur (1). It is stated that 1-2/1000 cases of VTE are seen in the world every year (1, 4). In Turkey, the prevalence of VTE in postoperative patients varies between 0.56 and 1 per 1000 (5, 6). However, approximately 600 thousand cases of VTE are seen

in the United States every year, causing 7-10 billion dollars of expenditure in the area of health (1, 4). VTE leads to prolonged hospitalization, an increase in treatment costs, complications and an increase in mortality (1). Therefore, interventions to prevent VTE are important in the care and treatment of patients.

National and international health organizations periodically publish and update clinical guidelines for the prevention and management of VTE (2, 4, 7, 8). Primarily pharmacological treatment methods are recommended for the prevention of VTE (1, 2). The use of mechanical protective measures is recommended besides the use of pharmacological treatment or in patients who cannot use pharmacological treatment (2, 7). Graduated compression stockings (GCS), one of the mechanical protective measures, are easy-to-access and cost-effective medical products when compared to other mechanical protective measures such as the intermittent pneumatic compression. The use of GCS in patients at low risk for the development of VTE is controversial (9). In a large-scale study conducted with patients at moderate and high risk for DVT, it was stated that pharmacological treatment alone may be sufficient to prevent DVT and that the use of GCS may be unnecessary in many patients (10). However, GCS is now widely used in patients with moderate and high risk (8, 11).

When GCSs are used effectively and properly in patients in the postoperative period, they decrease the incidence of DVT by reducing not only the general cross-sectional area of the leg but also venous distension, by enhancing the venous return and by improving the venous valve function (12, 13). In order for GCSs to be effective, they must be in appropriate sizes for the patients' body and provide the appropriate compression (13, 14). In addition, for the effective use of stockings, patients should know the points to be considered regarding the use of GCS (11). Skin problems such as insufficient compression and support, ring-shaped compression marks, tourniquet effect, dryness of the skin, itching and compression ulcers are frequently encountered as a result of improper use of GCS (13, 15, 16). Injuries due to the use of GCS are among important injuries related to mechanical devices (17). Especially the problems experienced by patients with leg edema are more common (11).

Although the use of GCS is an effective method in the prevention of DVT, patients' insufficient knowledge about the use of stockings may cause undesirable harmful effects. Healthcare professionals have an important role in enabling patients to access adequate and appropriate information. Nurses have an important role in the care, education and follow-up of patients at risk for DVT, yet there are still deficiencies in the interventions made in relation to this subject (18). Compliance with a standard protocol during the use of stockings for the prevention of embolism may help reduce the skin problems seen in patients (19). It was observed during the use of GCS in the clinic that misapplications were made; those patients had insufficient knowledge about this subject; and that skin problems related to the use of stockings were experienced. In this respect, the purpose of this study was to examine the patients' use of GCS in the postoperative period.

MATERIALS AND METHOD

Research Design

The study was carried out using the descriptive research design. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the clinical research ethics committee of Suleyman Demirel University (Decision Date: 24.05.2022 and number 11/150). In addition, the consents of the institution where the study was carried out were obtained. The study was conducted in the surgical department of a university hospital (General Surgery, Neurosurgery, Orthopedics, Thoracic Surgery and Cardiovascular Surgery) in western Turkey between September 2022 and January 2023.

Participants

The research sample consisted of 173 patients who were treated in the surgical clinics of a university hospital at the time the research data were collected and who met the sampling criteria. The criteria for inclusion in the research sample included being 18 years or older, agreeing to participate in the study voluntarily, being in the postoperative period, having undergone elective surgery, using GCS for the last 48 hours, being able to understand and speak Turkish, and having orientation for person, place and time. Among the criteria for being excluded from the research sample was the presence of a disease (such as dementia/Alzheimer's, schizophrenia, etc.) that may influence the capability of making decisions. The patients were asked for their consents with the help of Informed Consent Form, which included information about the purpose of the study, the

Table 1. Socio-demographic and clinical characteristics of the patients (n:173)

Variable	n	%
Gender		
Female	95	54.9
Male	78	45.1
Marital Status		
Single	26	15.0
Married	147	85.0
Educational Background		
Literature	54	31.2
Elementary School/Secondary School	55	31.8
High School	39	22.5
Bachelor degree or above	25	14.5
Financial Status Perception		
Income lower than expenditures	12	6.9
Income equal to expenditures	103	59.5
Income higher than expenditures	58	33.5
Employment		
Employed	66	38.2
Unemployed	107	61.8
Chronic Disease		
Yes	92	53.2
No	81	46.8
Body mass index		
Lower than 18.9 kg/m^2 (weak)	3	1.7
Between 19-24.9 kg/m^2 (normal)	66	38.2
Between 25-29.9 kg/m^2 (a little fat)	56	32.4
Between 30-34.9 kg/m^2 (obese)	26	15.0
Higher than 35 kg/m^2 (extremely obese)	22	12.7
The clinic of treatment received		
General surgery	34	19.7
Orthopedics	45	26.0
Brain and neurosurgery	38	22.0
Thoracic surgery	38	22.0
Cardiovascular	18	10.4
Prior surgical experience		
Yes	90	52.0
No	83	48.0
Post-operative standing up/mobilization		
Yes	108	62.4
No	65	37.6
	Mean ± Standard Deviation	
Age	58.84±13.67 (min-max=22-85)	
Postoperative mobilization time (Hour)	5.70±1.75 (min-max=1 -11)	
Satisfaction with the health service	7.23 ±1.00 (min-max=4-9)	

duration of the research process, the implementation process, data collection, voluntary participation in the study, leaving the study at any time, and keeping the participants' names confidential.

Data Collection Tools

The research data were collected using the Socio-Demographic and Clinical Characteristics Form and the Use and Knowledge Level of Graduated Compression Stockings Evaluation Form, from the patients who met the sampling criteria. While collecting the data, the face-to-face interview method was used when the patients' general condition was stable and appropriate. The stockings were put off to observe whether there was a problem related to the use of GCS in the patients, and they put on the stockings again after the observation. In order to ensure the reliability of the observational data, the data were collected together by two researchers. The data collection process lasted an average of 10-15 minutes. Moreover, some of the research data were obtained from the patients' medical records (type of anesthesia, and so on).

Socio-Demographic and Clinical Characteristics Form

This form was prepared by the researchers in line with the literature. The form was made up of a total of 18 questions regarding the socio-demographic and clinical characteristics of the patients, such as "age, gender, educational background, employment status, chronic disease, type of chronic disease, body mass index, the clinic where the treatment was received, the type of anesthesia used in the surgery, previous experience in surgical intervention, and so on" (11, 13, 16, 20).

The Use and Knowledge Level of Graduated Compression Stockings Evaluation Form

This form was prepared by the researchers in line with the guidelines and studies on the use of GCS (7, 10, 11, 13, 15, 16, 19, 21, 22). There were 33 questions in the form to evaluate the patients' use of GCS and their knowledge level.

Data Analysis

The research data were analyzed in 25 package programs of SPSS (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL). In accordance with the purpose of the study, descriptive statistics are shown as number (n) and percentage (%) values in categorical data and mean±standard deviation (Mean±SD) values in continuous data. Pearson Chi-square analysis was used to compare categorical variables between groups.

Table 2. Evaluating patients' use of graduated compression stockings and their knowledge levels (n:173)

Variables	n	%
Previous use of GCS*		
Yes	55	31.8
No	118	68.2
Time when GCS was used for the first time		
A few hours before surgery	1	0.6
In the operating room	9	5.2
In the clinic after the operation	163	94.2
Kind of GCS		
Knee-length	112	64.7
Thigh-length	61	35.3
Type of GCS		
With toes open	173	100.0
Measuring the leg before the use of GCS		
Yes	51	29.5
No	122	70.5
Compression level of the stockings used		
Not known	173	100.0
Need for assistance while putting on and off GCS		
Yes	88	50.9
No	85	49.1
Difficulties/problems experienced during the use of GCS according to the patient's report		
Itching	76	45.0
Feeling warm	74	43.8
Redness	66	39.1
Inability to put on/ off stockings without help	49	28.5
Causing pain	42	24.9
Sweating	24	14.2
Color change	23	13.6
Slipping of stockings	21	12.4
Difficulty in wearing	20	11.8
Sensibility	19	11.2
Other**	60	35.6
Fit of the GCS size		
Yes	110	63.6
No	63	36.4
If the GCS size is not suitable, how is it?		
Too tight	54	85.7
Too loose	9	14.3
Whether informed about GCS or not?		
Yes	96	55.5
No	77	44.5
Do you know why you use GCS?		
Yes	148	85.5
No	25	14.5
Why are you using GCS? (n=148)		
Prevention of clot formation	114	65.9
Prevention of swelling	10	5.8
Eliminating pain	24	13.9
Do you know how you should use GCS?		
Yes	140	80.9
No	33	19.1
Before I put on GCS, I lifted my feet up for a while (in bed).		
Yes	33	19.1
No	140	80.9
I put on GCS before getting out of bed.		
Yes	48	27.7
No	125	72.3
I wore it by placing the heel area of GCS properly.		
Yes	132	76.3
No	41	23.7
After the operation, I removed GCS for such reasons as examination, massage, and so on.		
Yes	118	68.2
No	55	31.8
I checked my skin by removing GCS during the day.		
Yes	98	56.6
No	75	43.4
I checked the toe opening and the upper part of the legs skin for redness, and so on.		
Yes	128	74.0
No	45	26.0
I paid attention to whether there were folds/wrinkles.		
Yes	109	63.0
No	64	37.0
I made sure that they ended 2.5-5 cm below the patella (if the stockings were knee-length).		
Yes	21	18.8
No	91	81.3
I made sure that they ended 2.5-7.5 cm below the gluteal fold (if the stockings were thigh-length).		
Yes	18	29.5
No	43	70.5
I washed GCS with warm water without rubbing it when they got dirty.		
Yes	55	31.8
No	118	68.2
I know how to remove GCS.		
Yes	118	68.2
No	55	31.8

*GCS: Graduated compression stockings, **Other: Includes tingling, unaesthetic appearance, restriction of movement, edema, numbness and dryness of the skin.

Table 3. Observations of the researchers regarding the use of graduated compression stockings worn by the patients (n:173)

Variable	n	%
Wearing GCS* with proper placement on the heel		
Yes	88	50.9
No	85	49.1
Wearing GCS without folds		
Yes	36	20.8
No	137	79.2
In the case of knee-length GCS, ending 2.5-5 cm below the patella (n=112)		
Yes	17	15.2
No	95	84.8
In the case of thigh-length GCS, ending 2.5-7.5 cm below the gluteal fold (n=61)		
Yes	12	19.7
No	49	80.3
The presence of problems observed in the tissue		
Yes	112	64.7
No	61	35.3
Problems observed in the tissue		
Redness	103	59.5
Squeezing	48	27.7
Edema	18	10.4
Other**	7	4

* GCS: Graduated compression stockings, Other** includes compression ulcer and tourniquet effect.

RESULTS

The mean age of the patients in the study sample was 58.84±13.67 years. Of the patients in the postoperative period, 54.9% were women; 31.8% were primary school/secondary school graduates; 61.8% of 59.5% were unemployed; 53.2% had a chronic disease; and 38.2% were of normal weight. Among all the patients, 26% of them were treated in the orthopedic clinic; 77.5% received general anesthesia; 52% had undergone previous surgery; and 62.4% were able to stand up after surgery (Table 1). The socio-demographic and clinical characteristics of the patients in the postoperative period are given in Table 1 below.

Of all the patients in the study sample, 68.2% of them had not used GCS before; 94.2% wore the stockings in the clinical setting after the surgery; 64.7% used knee-length stockings and 100% used open-toed stockings; the leg circumference and length of 70.5% were not measured before using GCS; 100% did not know the compression level of the stockings; 50.9% needed help while putting on and putting off GCS; 97.1% did not use an apparatus to put on the stockings; and 45% experienced itching during the use of stockings. Of all the patients in the postoperative period, 63.6% said the size of the GCS was appropriate; 85.7% said the stockings were too tight; 55.5% were informed about GCS; 85.5% knew why they used the stockings; 65.9% used them to prevent clot formation; and 80.9% said they knew how to use the stockings (Table 2).

In addition, 80.9% of the patients did not lift their feet while in bed for a while before putting on the GCS; 72.3% did not wear the stockings before getting out of bed; 76.3% of them placed the stockings on the heel properly; 68.2% of them put off GCS after the operation for such purposes as control, massage and so on; 56.6% checked their skin by removing them during the day; 74% of them checked their skin from their toe opening or from the upper part of their legs where the stockings ended; 63% of them checked the stockings not to have folds/wrinkles while using them; 81.3% of them did not pay attention to the fact that the knee-length stockings should end 2.5-5 cm below the patella; 70.5% did not pay attention to the fact that the thigh-length stockings should end 2.5-7.5 cm below the gluteal fold; 68.2% of them did not wash the stockings with warm water when they got dirty; and 68.2% knew how to put off the stockings (Table 2). Moreover, it was seen that the number of days after GCS was worn was 2.97±2.14 (min-max=2 -18); the number of GCS removals was 2.02±0.92 (min-max=1 -6); and satisfaction level with the training provided by healthcare professionals on the use of GCS was 5.97±1.58 (min-max=1-9).

In the postoperative period, 50.9% of the patients placed GCS properly on the heel; 79.2% did not wear it without any folds; 84.8% did not wear the knee-length compression stockings 2.5-5 cm below the patella; and 80.3% did not wear the thigh-length compression stockings below the gluteal fold. In addition, 59.5% of the patients were observed to have redness in the area when the GCS was removed (Table 3).

According to the researcher observations, a statistically significant difference was found between the patients' proper use of stockings who received information from healthcare providers about GCS and those who did not. It was revealed that the patients who received training had significantly better results in terms of placing the stockings properly on the heel, wearing them without any fold, and wearing them as appropriate to the knee-length or thigh-length ($p<0.05$). In addition, it was found that the problems observed in the tissue related to the use of GCS in the patients were fewer in number in the group that received information ($p<0.05$) (Table 4). There was

Table 4. Comparison of researcher observations and informing patients about GCS* (n=173)

Variables		Informing about GCS		Analysis**
		Yes n (%)	No n (%)	x^2/p
Wearing GCS with proper placement on the heel	Yes	56 (58.3)	32 (41.6)	**4.81/ 0.028**
	No	40 (41.7)	45 (58.4)	
Wearing GCS without folds	Yes	32(33.3)	4(5.2)	**20.53/ 0.001**
	No	64(66.7)	73(94.8)	
In the case of knee-length GCS, ending 2.5-5 cm below the patella (n=112)	Yes	15 (24.6)	2 (3.9)	**9.21/ 0.002**
	No	46 (75.4)	49 (96.1)	
In the case of thigh-length GCS, ending 2.5-7.5 cm below the gluteal fold (n=61)	Yes	11 (31.4)	1 (3.8)	**7.18/ 0.007**
	No	24 (68.6)	25 (96.2)	
Observed problems	Yes	50 (52.1)	62(80.5)	**15.13/ 0.001**
	No	46 (47.9)	15 (19.5)	

* GCS: Graduated compression stockings ** Pearson Chi-square test

no statistically significant difference between the type of GCS (knee-length and thigh-length) and proper placement of stockings, wearing without any folds or having problems based on the use of stockings ($p>0.05$).

DISCUSSION

According to the reports of the patients in this study, only one third of the body measurements were taken before using GCS. In the literature, it is pointed out that the body measurements of patients should be taken in the preoperative period and that suitable stockings should be according to these measurements (13, 19, 23). Studies demonstrated that patients use stockings in the wrong size and that there is no documentation for the size of stockings used by patients (13, 16). Winslow and Brosz (2008) found that the stockings used in 26% of the postoperative patients were not suitable for the patient's size, and Miller (2011) reported that 36% of the patients did not use stockings appropriate to their size in the postoperative period. Miller (2011) stated that the stockings with the wrong size were one-size or two-size larger than the body measurements of the patients and that these stockings did not allow an effective use in terms of preventing VTE. GCS must be able to provide effective compression in order to reduce the risk of VTE (14).

According to the reports of the patients in the study, about half of them could not get enough information about GCS. The patients generally stated that they knew what the stockings were used for (85.5%). However, when their answers to the question of "Why do you use them" were considered, it was seen that some of the patients (19.7%) did not have accurate knowledge about the purpose of using stockings. Moreover, the patients did not have knowledge about the compression levels of the stockings used. These findings suggest that the patients did not have sufficient knowledge about GCS. Furthermore, the answers given by the patients to the questions about their use of GCS showed that the majority of them did incorrect practices such as wearing stockings after getting out of bed; that about half of them did not put off the stockings at all; that about half of them did not check their skin; or that more than one-third of the patients did not pay attention to the formation of folds. In a study conducted by Winslow and Brosz (2008), it was found that 20% of surgical patients did not know the purpose of using stockings and that 29% of them used stockings improperly (13). On the other hand, Özkan et al. (2016) found that patients in the postoperative period did practices regarding the use of stockings and that their knowledge about this subject was insufficient (16). Improper practices during the use of GCS may cause the use of stockings to be ineffective, the patient's risk of DVT to continue, or problems to occur such as skin problems related to the use (11). Similar to the research findings in the literature, it was seen that the patients had insufficient knowledge about the use of stockings and wore them wrongly.

In this study, it was revealed that the patients had a moderate level of satisfaction with the information they received about the use of GCS (5.97±1.58). The researcher observations demonstrated that the patients who received information about GCS had better use of GCS than the patients who were not informed. It was also seen that these patients placed the stockings properly, paid attention to the absence of folds, and wore the stockings according to the thigh-length or patella-length. In addition, it was found

that the problems observed due to the use of GCS were fewer in these patients. Nurses have important responsibilities in informing and monitoring patients who will use GCS in clinics (11, 14). Nurses should check the patient's skin before wearing GCS and should contact the doctor when there is a situation that prevents them from wearing stockings. In order for the stockings to be used effectively by the patients, they should be provided with adequate education and information, and they should continue their education at intervals during patient follow-up (11, 13). In the regulation on the Amendment of the Nursing Regulation (Official Gazette, 19 April 2011, Number: 27910), nurses' attempts to prevent embolism are legally recorded (24). In the literature, it is reported that although nurses' attitudes towards the use of GCS are positive, there are deficiencies in their knowledge and behaviors regarding this subject (25, 26). Karadogan et al. (2020) found that nurses had insufficient knowledge about the risk factors for venous thromboembolism, about pharmacological and non-pharmacological interventions for the prevention of venous thromboembolism, and about patients' education (20). Inadequacies in both knowledge and behavior are important obstacles that cause patients not to use graduated stockings properly in clinics. It was found that with the clinical use of the anti-embolism stockings care protocol developed by Akyüz and Tunçbilek (2021), the knowledge and practical skills of nurses increased and that the problems encountered by patients related to the use of stockings decreased (19). The guideline published by the American Society of Operating Room Nurses for the prevention of DVT advises establishing and implementing an evidence-based protocol in line with the research results, evaluating the patient in the preoperative period, applying mechanical and pharmacological prophylaxis effectively, providing patients with education, and recording the interventions (23). Parallel to the literature, the findings obtained in the study showed that patients' education was necessary to increase the proper use of GCS and to reduce the problems experienced, similar to the literature.

In the study, the patients stated that they experienced problems such as itching (45.0%), feeling of warmth (43.8%), redness (39.1%), inability to put on and off stockings without help (28.5%) and pain (24.9%) due to the use of GCS. The researchers' observations of the patients revealed that redness (59.5%) and squeezing (27.7%) were encountered most frequently. Studies demonstrated that similar problems were experienced due to the use of stockings in the postoperative period (11, 13, 15, 16, 27). Ozkan et al. (2016) found that patients in the postoperative period mostly experienced problems such as inability to put on and off stockings without help and sweating due to the use of stockings. On the other hand, Winslow and Brosz (2008) reported that most of the surgical patients experienced discomfort due to the use of stockings and that 20% of the patients had redness. In a study examining patients who needed to use compression stockings for a long time, it was revealed that the patients had problems such as difficulty in putting on and off stockings, tightening, sweating and itching (27). These problems were frequently seen in the areas of stockings that were under high compression locally (28). It was reported that the problems experienced in patients in the postoperative period were fewer in patients who used low-compression stockings (21). Improper use of stockings can also cause problems to increase. In a study, it was found that improper use of stockings was more common in patients who were overweight and who used thigh-length stockings and that problems related to the use of stockings were more common (13). In the literature, it is pointed out that the skin should be clean and dry before stockings are used and that stockings should be removed and re-worn daily for skin control (11). The findings obtained in the present study are similar to those reported in the literature, and ineffective use of GCS can lead to serious problems.

In the study, it was seen that mostly knee-length stockings were used by the patients (64.7%). Interventions for the prevention of venous thromboembolism should also ensure the comfort of patients (29). Studies showed that it was easier for patients to adapt to knee-length stockings and that they preferred to use knee-length stockings (13, 30, 31). In addition, it was reported that improper use was more common in patients who used thigh-length stockings (13). In this study, it was seen that regardless of the type of stockings, the patients had similar problems in terms of placing the stockings properly, wearing them without folds, and the problems experienced.

This study has some limitations. The study was performed in a single center, which limits the generalizability of the results. In the section where the patients' use of GCS was observed by the researchers, the form was filled in with two

researchers' consensus as a result of their observations. The fact that the researchers made observations individually and that inter-observer agreement was not examined was considered to be another limitation of the study.

CONCLUSION

In the study, the patients did improper practices such as wearing stockings improperly, not paying attention to folds, and not using stockings with appropriate compression, and they therefore experienced problems such as redness, itching and pain while using the stockings. These problems were less common in patients who received sufficient information about the use of GCS. It is recommended that nurses working in surgical clinics, as care providers, adequately inform their patients about the use of GCS. In addition, patients' use of GCS should be monitored; problems that may occur through daily skin check should be detected early; and preventive measures should be taken. It is also recommended that a protocol be developed and that this protocol be implemented in clinics so that all healthcare professionals can act jointly towards the use of GCS.

What did the study add to the literature?

- It has been revealed that the problems experienced in relation to the graduated compression stockings, which are widely used, still continue.
- Patients are in need of being informed about the use of graduated compression stockings.
- It has been found that training on the use of compression stockings increases their proper use and reduces the observed complications.

Acknowledgements: This research was presented as an oral presentation at 6th International Health Science and Life Congress (IHSLC 2023), Burdur /Türkiye, 2-5 March 2023.

Author Contributions: Concept: FS, AB; Design: FS, AB; Consulting/Supervision: FS, AB; Data collection and/or processing: FD, NNY, FS, AB; Data analysis and/or interpretation: AB, FS; Literature search: FS, AB, FD, NNY; Article writing: FS, AB, FD, NNY; Critical review: AB, FS.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the clinical research ethics committee of Suleyman Demirel University (Decision Date: 24.05.2022 and number 11/150).

Funding: The authors did not receive any financial support in conducting this study.

Peer-Review: Externally peer-reviewed.

REFERENCES

1. Khan F, Tritschler T, Kahn SR, Rodger MA. Venous thromboembolism. The Lancet 2021;398(10294):64-77.
2. Demir M, Erdemli B, Kurtoğlu M, Öngen G. Ulusal venöz tromboembolizm profilaksi ve tedavi kılavuzu. İstanbul: Gü-Ven Platformu; 2010.
3. Roberts SH, Lawrence SM. Venous Thromboembolism. Am J Nurs 2017;117(5):38-47.
4. Ortel TL, Neumann I, Ageno W, et al. American society of hematology 2020 guidelines for management of venous thromboembolism: treatment of deep vein thrombosis and pulmonary embolism. Blood Adv 2020;4(19):4693-738.
5. Atılgan K, Demirdaş E, Er CZ, Çiçekçioğlu F. Evaluation of deep vein thrombosis incidence with respect to age and gender in light of regional factors in central Anatolia: A population-based study. Journal of Surgery and Medicine 2020;4(1):62-65.
6. Edeer AD, Comez S, Damar HT, Savcı A. Prevalence and risk factors of venous thromboembolism in postoperative patients: A retrospective study. Pak J Med Sci 2018;34(6):1539.
7. Sachdeva A, Dalton M, Amaragiri SV, Lees T. Elastic compression stockings for prevention of deep vein thrombosis. Cochrane Database Syst Rev 2010(7).
8. Sachdeva A, Dalton M, Lees T. Graduated compression stockings for prevention of deep vein thrombosis. Cochrane Database Syst Rev 2018(11).
9. Machin M, Peerbux S, Whittley S, et al. Examining the benefit of graduated compression stockings in the prevention of hospital-associated venous thromboembolism in low-risk surgical patients: a multicentre cluster randomised controlled trial (PETS trial). BMJ Open 2023;13(1):e069802.
10. Shalhoub J, Lawton R, Hudson J, et al. Graduated compression stockings as adjuvant to pharmaco-thromboprophylaxis in elective surgical patients (GAPS study): randomised controlled trial. BMJ 2020;369.
11. Akyüz E, Tunçbilek Z. Antiembolik çorap yönetiminde hemşirelerin rol ve sorumlulukları:

antiembolik çorap bakım protokolü. Turk J Cardiovasc Nurs 2018;9(20):96-104.
12. Lim CS, Davies AH. Graduated compression stockings. CMAJ. 2014;186(10):E391-E8.
13. Winslow EH, Brosz DL. Graduated compression stockings in hospitalized postoperative patients: correctness of usage and size. Am J Nurs 2008;108(9):40-50.
14. Geçit S, van Giersbergen MY. Cerrahi hasta bakımında venöz tromboembolizmin önlenmesi kanıt temelli uygulama önerileri. E.Ü. Hemşirelik Fakültesi Dergisi 2021;37(2):179-187.
15. Miller JA. Use and wear of anti-embolism stockings: a clinical audit of surgical patients. Int Wound J 2011;8(1):74-83.
16. Özkan ZK, Fındık Ü, Ünver S. Hastaların ameliyat sonrası kompresyon çorabı kullanma durumlarının değerlendirilmesi. Florence Nightingale Hemşirelik Dergisi 2016;24(1):30-37.
17. Hobson DB, Chang TY, Aboagye JK, et al. Prevalence of graduated compression stocking–associated pressure injuries in surgical intensive care units. J Crit Care 2017;40:1-6.
18. Morrison R. Venous thromboembolism: scope of the problem and the nurse's role in risk assessment and prevention. J Vasc Nurs 2006;24(3):82-90.
19. Akyüz E, Tunçbilek Z. Anti-embolism stocking care protocol to prevent associated skin problems: A quasi-experimental study. J Tissue Viability 2021;30(1):89-94.
20. Karadoğan K, Durna Z, Akın S. Hemşirelerin venöz tromboemboli risk faktörleri ve koruyucu girişimlere yönelik bilgi düzeylerinin değerlendirilmesi. JAREN 2020;6(1):36-43.
21. Ayhan H, Iyigun E, Ince S, et al. A randomised clinical trial comparing the patient comfort and efficacy of three different graduated compression stockings in the prevention of postoperative deep vein thrombosis. J Clin Nurs 2015;24(15-16):2247-2257.
22. National Institute for Health and Care Excellence (NICE). Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism. NICE guideline: 2019 Aug. London (UK).
23. Association of Perioperative Registered Nurses (AORN). Guideline Quick View: Venous Thromboembolism. AORN J 2018;107(2):281-5.
24. Çalişilan birim/servis/ünite/alanlara göre hemşirelerin görev, yetki ve sorumluluklari. Hemşirelik yönetmeliğinde değişiklik yapılmasına dair yönetmelik. Resmi Gazete (TC): 2011 Nisan. Rapor No:27910.
25. Varghese BA, Ezhilarasu P, Rajan A, Jesudason MR, Jeyaseelan V. Knowledge, attitude, and practice of nurses regarding use of Anti-embolism stockings. Indian Journal of Continuing Nursing Education 2016;17(2):31.
26. Xu Y, Wang W, Zhao J, Wang J, Zhao T. Knowledge, attitude, and practice of healthcare professionals toward clinically applying graduated compression stockings: results of a Chinese web-based survey. J Thromb Thrombolysis 2019;47:102-108.
27. Yılmaz S, Yaylaci S, Diken A, Yalcinkaya A, Aksoy E. Alt ekstremite venöz yetmezligi tedavisinde kompresyon çoraplari ve kullanımını etkileyen faktörler. Damar Cerrahi Dergisi 2015;24(1):47-53.
28. Williams A, Davies P, Sweetnam D, et al. Knee-length versus thigh-length graduated compression stockings in the prevention of deep vein thrombosis. Journal of British Surgery 1996;83(11):1553.
29. Brady D, Raingruber B, Peterson J, et al. The use of knee-length versus thigh-length compression stockings and sequential compression devices. Crit Care Nurs Q 2007;30(3):255-262.
30. Hilleren-Listerud AE. Graduated compression stocking and intermittent pneumatic compression device length selection. Clin Nurse Spec 2009;23(1):21-24.
31. Wade R, Paton F, Woolacott N. Systematic review of patient preference and adherence to the correct use of graduated compression stockings to prevent deep vein thrombosis in surgical patients. J Adv Nurs 2017;73(2):336-348.