Original Article

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Foot Care Applications of Patients with Tinea Pedis Diagnosis and Affecting Factors

Tinea Pedis Tanısı Alan Hastaların Ayak Bakımı Uygulamaları ve Etkileyen

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ABSTRACT

Objective: The aim of this study is to determine the adequacy of foot care practices and the influencing factors of patients diagnosed with tinea pedis.

Methods: Participants are 187 patients who were examined in a dermatology outpatient clinic in a state hospital in Anatolia between January 10 and April 15, 2021 and were diagnosed with tinea pedis. The research was carried out by applying a face-to-face questionnaire to the participants.

Results: Exploratory factor analysis was performed on the scale used in the study. The total foot scale mean score of the group was found to be 39.31±7.98. The average age is 40.370±0.693, and that of men is 37.313±1.018. The majority are university graduates (69.1%), health insurance is obtained by the social security institution (41.0%). Employees working as civil servants more (32.4%), equal to the income and expenses of the majority (46.9%) and 67%; I smoke 6 cigarettes. Those with chronic diseases are 21.8%. 17% of them regularly use medication.

Conclusion: It was determined that the foot care witchcraft scores of women, those living in the city, those who have the habit of wiping/washing the inside of their shoes, daily airing and changing daily socks were found to be higher. It may be suggested to the society; training on foot hygiene, the use of shoes and socks, foot

ÖZ

Amaç: Bu çalışmanın amacı tinea pedis tanısı alan hastaların ayak bakımı uygulamalarının yeterliliğinin ve etki eden faktörlerin belirlenmesidir.

Yöntemler: Katılımcılar, 10 Ocak-15 Nisan 2021 tarihleri arasında Anadolu'da bir devlet hastanesinde dermatoloji polikliniğinde muayene olan ve tinea pedis tanısı alan 187 hastadır. Araştırma, katılımcılara yüz yüze yöntemi ile anket uygulanarak gerçekleştirildi.

Bulgular: Araştırmada kullanılan ölçeğe doğrulayıcı faktör analizi yapıldı. Grubun ayak bakım ölçeği toplam puan ortalaması 39,31±7,98 olarak tespit edildi. Katılımcılardan kadınların yaş ortalaması 40,370±0,693, erkeklerin 37,313±1,018'dir. Çoğunluk üniversite mezunu (%69,1), sağlık güvencesi sosyal güvenlik kurumu tarafından sağlamaktadır (%41,0). Memur olarak çalışanlar daha fazla (%32,4), çoğunluğun (%46,9) geliri giderine eşit ve %67,6'sı sigara kullanmamaktadır. Kronik hastalığa sahip olanlar %21,8'dir. Bunlardan %17'si düzenli ilaç kullanmaktadır.

Sonuç: Kadınların, kentte yaşayanların, ayakkabısının içini silme/yıkama, günlük havalandırma ve günlük çorap değiştirme alışkanlığı olanların ayak bakımı davranışı puanlarının daha yüksek olduğu tespit edilmiştir. Topluma; ayak hijyeni, ayakkabı ve çorap kullanımı, ayak bakımı ve önemi hakkında eğitim verilmesi, eğitimlerde kırsalda yaşayanları ve erkek popülasyonu kapsayacak şekilde düzenlenmesi önerilebilir.

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care and its importance, it may be suggested to organize it in a way that includes the residents and the male population.

Keywords: Foot care, nursing, tinea pedis

Anahtar Sözcükler: Ayak bakımı, hemşirelik, tinea pedis

Introduction

Tinea pedis (TP) is a fungal infection that can be caused by different types of fungi and can be seen on the soles of the feet, between the toes, and on nails (1). Foot hygiene and moisture are two very important factors in fungal infections of foot (2, 3). Common areas such as showers, bathrooms, pools, and shared use of shoes, socks, and personal care products affect the transmission of infection. Inadequate foot hygiene, wrong choice of shoes, inadequate hygiene of shoe and socks also facilitate the formation of fungus (4,5). According to the literature, the correct application of foot care, being educated on this subject, the level of education (5,6), gender (7), the shoes used (8) affect the formation of fungus. Living in the countryside (6), using closed shoes (7), and the presence of some chronic diseases (5) increase the occurrence of infection. The incidence of TP has been reported to be between 15% and 46% in studies in the literature (7,9-11). Although imidazole, allylamine and benzylamine groups and other antimycotic agents can be used in the medical treatment of TP, especially emphasizing the importance of foot care and hygiene will increase the success of the treatment (1).

Foot care is an application that can be learned and taught. There are many studies showing that foot care training is very effective and positive results are achieved especially in diabetic individuals (11-14). Training on the adequacy of foot care practices (5,6,8) and the use of correct socks and shoes and ensuring their cleanliness (5,7,8) have positive contributions to the foot health of the individual (5,6,11). It is explained that the socio-cultural level of the individuals, depending on the education level (5) and the place they live in, affects the foot care and foot health (6).

There are many studies conducted with diabetic patients who apply foot care correctly (11-14). The general conclusion drawn from the studies is that the rate of foot lesions decreases significantly in individuals who apply foot care correctly (15). However, although the necessity of foot care and hygiene in patients with TP is explained (1-10), no study evaluating foot care behaviors for these patients has been found in the literature. Therefore, in this study, it was aimed to determine the adequacy of foot care practices and the affecting factors of patients with TP.

Methods

This was a descriptive and correlational research.

Research Hypotheses

H1: Patients with TP have different foot care application scores according to their socio-demographic features (age, gender, place of residence, education level, occupation, income level)

H2: Patients with TP have different foot care application scores according to their health-related features (Smoking, chronic disease and drug use).

H3: Patients with TP have different foot care application scores according to their foot hygiene habits (wiping/washing shoes, airing shoes, changing socks).

Location and Characteristics of the Research

The research was conducted in a state hospital in Anatolia.

The Universe of the Research

The population of the study consisted of patients who were admitted to the dermatology outpatient clinic of the hospital where the study was conducted.

Sample of the Research

All patients who were diagnosed as having TP and who were admitted to the dermatology outpatient clinic without selecting a sample and meeting the inclusion criteria were included in the study. Sample calculation was made in accordance with studies of unknown population. The frequency of occurrence of 20% was used by taking the average of 0.05 margin of error, 90% confidence interval and the value range (7,9-11) given in the literature. The sample calculation was made on a web page (16), and it was calculated that the number should be at least 172. A sample of 187 patients who were admitted to the dermatology outpatient clinic of the hospital, were diagnosed as having TP, agreed to participate in the study, and met the inclusion criteria were included in the study.

Inclusion Criteria for Participants in the Study

Being between the ages of 18-65

Having been diagnosed as having TP

Not experiencing clouding of consciousness

Agreeing to participate in the research

Not having a problem with reading and understanding Turkish

Exclusion Criteria for Participants in the Study:

Being unable to care for oneself/needing someone else's help for care

Foot wound/presence of diabetic foot

Data Collection Technique and Tools

The data were collected face to face by the researcher in the outpatient clinic. Written consent was obtained from the patient before the data were collected. After the diagnosis of TP was made for the patient who came for the outpatient clinic examination, the data were collected with the data collection form in the time period suitable for the patients. Data were collected with a patient information form and a foot care behavior scale.

Patient Data Form

The patient data form was created by the researchers based on the literature (1-8). The form includes 16 items questioning age, gender, income level, education, smoking, use of socks and shoes, chronic disease and drug use.

Foot Self Care Observation Guide

Borges and Ostwald (2008) developed the "Foot Self Care Observation Guide" and this guide was converted into a 16-item scale in line with the American Diabetes Association criteria. The scale was adapted into Turkish by Kırbiçer and Enç (2011). The Turkish version (Foot Care Behavior Scale-FCBS) is a five-point Likert-type scale consisting of 15 items (1= Never, 2= Sometimes, 3= Sometimes, 4= Often, 5= Always). The Cronbach alpha coefficient is 0.83. The lowest possible score on the scale is 15; the highest score is 75. The scale has no sub-dimensions and cut-off points.

Data Collection

Data were collected through face-to-face interviews with the patient in the dermatology outpatient clinic between January 2021 and April 2021.

Variables of the Study

Dependent variables: Scale total score.

Independent variables: Age, gender, place of residence, education, occupation, income, presence of chronic disease, drug use, smoking status, practice of cleaning shoes, ventilation of shoes, changing socks

Ethical Aspect of Research:

- Permission for the research was obtained from the Ethics Committee of the Faculty of Health Sciences of Necmettin Erbakan University (date: 06.01.2021/meeting: 6/decision: 4).
- Written informed consent was obtained from the participant along with the data collection form.
- Permission for use was obtained from the scale owners.
- The research was performed in accordance with the Declaration of Helsinki
- This research was prepared, applied and reported according to the Observational Research Reporting Criteria (STROBE) (17).

Limitations of the Research

The limitation of the study was that the patients wanted to stay in the outpatient clinic as short as possible, since the study was conducted during the Coronavirus disease-19 pandemic.

Statistical Evaluation of Data

The statistical analyses were made using the Statistical Package for Social Sciences (SPSS, IBM, v. 22) and SPSS AMOS 22 program. In descriptive statistics; number, percentage, chi-square test and arithmetic mean were used, while Kruskal Wallis and Mann-Whitney U tests were used for relation-seeking statistics. A single factor confirmatory factor analysis (CFA) was performed for the scale used. All results were evaluated at the 0.05 significance level.

Results

Test of the Scale Used in the Research

In order to test the validity of the scales used, a single factor CFA was performed for the FCBS. Since the fit values produced by the measurement models created to test the validity of the scales were not within acceptable limits, the modifications suggested by the program were made and four statements (2,12,13,14) were removed from the scales. Since the values of X2/df=2.092, GFI =0.915, CFI =0.957, RMSEA =0.076 were within acceptable limits, the structures of the scales used in the study were verified. The factor loadings of the scales and the Cronbach-alpha coefficients for their reliability are shown in Table 1. According to the results in Table 1, the fact that the factor loads are at least 0.50 and higher than this value indicates that each statement has loads that can explain the foot care behavior structure (18). Likewise, the Cronbach Alpha coefficient for the reliability of the FCBS was obtained as 0.752 and it was concluded that the scale was reliable.

The mean age of the women was 40,370±0.693, and the mean age of the men was 37.313±1.018. Majority of them were university graduates (69.1%) and health insurance was provided by the social security institution in 41.0% of them. Employees as civil servants constituted 32.4% of the participants, the income of the majority (46.9%) was equal to their expenses, and 67.6% of them did not smoke. Those with chronic diseases constituted 21.8% of the participants. Of them 17% used regular medication. The total mean score of the FCBS was 39.31±7.98 (minimum:18-maximum:54).

Of the participants 67.9% (127) were females and 32.1% were males (60), Most of them were living in the city center (70.7%), had the habit of wiping/washing the inside of their shoes (59.6%), aired their shoes (79.6%) and changed their socks daily (87.2%) (Table 2).

According to the analyzes made, FCBS scores were similar according to educational status, health insurance, occupation, income level, smoking status, having a chronic disease and using regular medication ($p>0.05$). In addition, gender, place of residence, foot washing, foot ventilation and socks changing habits made a difference in FCBS score ($p<0.05$). Foot care score was found to be 40.370±0.693 in women and it was 37.316±1.018 in men, and the difference was statistically significant ($p=0.008$). Accordingly, FCBS scores of males were lower than female individuals. The FCBS scores of the people living in the province, district and village were 39.406±0.702, 40.428±1.171 and 34.846±1.947, respectively. The FCBS scores of the people living in the province and the district are similar ($p<0.05$), but higher than those living in the village. The difference is significant ($p=0.049$). The FCSB score was higher in

Table 1. Foot care behavior scale factor loads and cronbach-alpha coefficients

Questions	Factor loads	Item reliability	Overall scale reliability
I control the temperature of the water I wash my feet in (ABO1)	0.537	0.373	0.752
I use moisturizing cream for my feet (ABO3)	0.580	0.312	
I do not apply cream between the toes (ABO4)	0.516	0.390	
I cut my toenails straight (ABO5)	0.736	0.408	
I check my nails for thickening, ingrownness and length (ABO6)	0.767	0.585	
I check the skin for peeling, fungus and clawing due to moisture between the fingers (ABO7)	0.777	0.650	
I check the bottom of my feet for calluses, redness, blisters or open sores (ABO8)	0.649	0.657	
I check the inside of the shoes for foreign objects such as nails, dust, stones (ABO9)	0.519	0.545	
I don't go anywhere barefoot (eg: at home, on the street, on the beach) (ABO10)	0.670	0.328	
I wear shoes that fit my feet perfectly, suitable for width, height and height (ABO11)	0.602	0.455	
I do not use sharp tools (razor, scissors, etc.) while doing my foot care (ABO15)	0.525	0.320	

the group who wiped/washed their shoes regularly (40.571±0.703 and 37.473±0.967) and the difference was significant (p:0.026). The FCBS score of those who had the habit of airing their shoes regularly was 40.00±0.608 and it was 36.184±1.527 in those who did not, and the difference was significant (p:0.031). The FCBS scores were 40.067±0.580 in individuals who changed their socks regularly, and 34,208±1.987 in those who did not have the habit of changing their socks regularly. The group that changed their socks regularly had a higher score and the difference was significant (p:0.007) (Table 3).

Table 2. Descriptive statistics

		Frequency	Percentage (%)
Gender	Female	127	67.9
	Male	60	32.1
	Total	187	100
Living place	Province	133	70.7
	District	42	22.3
	Village	13	6.9
	Total	188	100.0
Wiping/washing the inside of the shoe	Yes	112	59.6
	No	76	40.4
	Total	188	100.0
Airing the shoes	Yes	149	79.6
	No	38	20.4
	Total	187	100.0
Changing socks	Yes	164	87.2
	No	24	12.8
	Total	188	100.0

Discussion

No study was found in which foot care behavior was evaluated in individuals with TP. However, in a study evaluating the relationship between diabetes and foot care, it was reported that foot care was generally inadequate and the rate of those with TP was 53.4% (19). It is stated that foot care is evaluated within the scope of self-management in diabetic patients and that care is not sufficient (12-14). It was reported in a study that the foot care score was 49.02±10.25 in diabetic patients (11). In another study, foot care scores of diabetic adults were reported as 43.16±5.70 (20). In our study, the FCBS total score of our group was lower than the diabetic patients (39.31±7.98). With these results, it can be concluded that foot care behavior is effective in the development of TP.

One of the factors thought to be effective in the development of TP is gender. In a study conducted with 420 participants, the relationship between the shoes used and TP was examined and it was stated that the probability of TP occurrence increased in male gender [odds ratio (OR): 1.80, p<0.01] (8). In another study, it was reported that 61.7% of 399 participants diagnosed as having nail fungus were male, and the incidence of TP was higher, especially in males (21). The result of the study in which patients with TP and eczema were evaluated showed that while the rate of TP was 80% in men, it was 45% in women (22). Similarly, in a study in which 2,574 people were evaluated in a rural area in Turkey, it was stated that the incidence of fungal infections of the hands and feet was higher in men than in women (male OR: 1, female OR: 0.39), and it was stated that the difference was significant (p=0.000) (23). In this study, women's FCBS score was found to be higher which supported the literature. It can be thought that women are more sensitive to foot care than men.

In a study conducted with farmers in rural areas, the knowledge level of the participants about TP was questioned and it was

Table 3. Difference analysis according to descriptive variables

		N	Mean	Std. error	Median	Min	Max	P
Gender *	Female	127	40.370	0.693	40	18	54	-2.664
	Male	60	37.316	1.018	37	18	51	**0.008**
Living place**	Province	133	39.406	0.702	39	18	54	5.892
	District	42	40.428	1.171	40	18	51	**0.049**
	Village	13	34.846	1.947	35	24	46	
Education status**	Literate	3	27.333	3.179	27	21	31	
	Primary education	31	39.193	1.349	39	23	53	6.801
	secondary education	24	38.666	1.622	39	18	51	0.079
	University	130	39.746	0.701	40	18	54	
Health insurance**	No	27	39.592	1.556	39	19	53	
	Emekli sandigi	54	39.481	0.840	39	19	51	
	Bagkur	15	36.533	1.973	36	18	46	5.297
	SSK	77	40.129	1.005	40	21	54	0.381
	Special insurance	8	34.750	3.989	35	18	45	
	Green card	7	39.285	2.327	39	33	50	
Occupation**	Housewife	27	38.296	1.359	38	26	53	
	Retired	12	41.916	1.311	42	30	48	
	Employee	13	34.538	2.615	34	22	46	7.582
	Self-employed	14	35.785	2.431	36	18	47	0.108
	Officer	61	39.836	1.012	40	18	54	
	Not working	12	37.166	1.841	37	24	45	
	Other	49	41.408	1.163	41	19	51	
Income status**	Income less than expenses	62	38.532	1.057	38	18	51	0.510
	Income equals expense	88	39.988	0.723	40	19	51	0.775
	Income more than expenses	37	39.000	1.643	39	18	54	
Smoking**	Yes	52	37.653	1.209	38	18	51	2.719
	No	127	40.063	0.688	40	18	54	0.257
	Quit smoking	9	38.444	1.780	38	31	45	
Wiping/washing shoes*	Yes	112	40.571	0.703	41	18	54	-2.222
	No	76	37.473	0.967	37	18	51	**0.026**
Airing foot*	Yes	149	40.100	0.608	40	18	54	-2.162
	No	38	36.184	1.572	36	18	50	**0.031**
Changing socks**	Yes	164	40.067	0.580	40	19	54	-2.688
	No	24	34.208	1.987	34	18	46	**0.007**
Having a chronic disease*	Yes	41	38.658	1.160	39	18	50	-0.761
	No	147	39.503	0.671	39	18	54	0.447
Regular medication*	Yes	32	38.843	1.289	39	26	50	-0.627
	No	156	39.416	0.651	39	18	54	0.531

*Mann-Whitney U test
**Kruskal-Wallis test

stated that their knowledge was insufficient in 62% (6). Taking care of foot hygiene and having knowledge about it are important to prevent the development of TP (1,58). The structure of the shoes used and the cleanliness of the inside are an important factor in the development of the infection. For this reason, it is necessary for individuals to choose shoes correctly and to have sufficient interior cleaning (7). As the level of awareness of individuals about foot care, shoe and stocking preference and use increases, the incidence of TP decreases, and their awareness of the transmission routes of the infection increases (5). In this

study, the FCBS score of the people living in the village was found to be lower than those living in the city center and town. It can be thought that the people living in the village do not have enough awareness about foot care.

Foot hygiene habits include hygiene of shoes, feet and socks. In addition, it includes proper foot care (4,5). Keeping the feet dry and clean is an important factor in preventing the formation of fungal infections. While the feet of swimming pool workers are constantly wet and because they work in a humid and hot environment with a high risk of contamination, the incidence of TP is 15 times higher than in normal individuals (3), while it is stated that wearing closed shoes in military personnel increases this risk by four times (7). Leather, ventilable and cleanable shoes are recommended to be preferred. In a study conducted with 420 patients, the humidity of the inside of the shoes and the internal temperature were explained as factors that increased the risk, and it was stated that this risk increased even more for men (8). The inside of the shoes, which prevent the foot from airing, keep the foot warm and sweaty, is a suitable environment for the development of microorganisms. Because both fungi and bacteria can cause infection in TP (10). Wearing boots that limit the ventilation of the feet, preference of synthetic leather shoes, and high indoor temperature (8) and sweating feature of the shoes are shown as risk factors due to causing humidity and high internal temperature ($p<0.05$) (8,9). In addition, it is emphasized that it is important to evaluate individuals with undiagnosed "hidden TP" symptoms such as bromodosis in addition to diagnosed TP (9).

When TP is diagnosed, an infection caused by microorganisms is mentioned. Before diagnosis, these microorganisms can identify themselves with odor on the feet/in the shoes (9). Microorganisms can create a living space in shoes as in many places. In the study examining the microorganisms in 50 pairs of shoes used daily, it was stated that 15 different fungal species were isolated in the shoes. Among the isolated species, there are also those known to cause TP. It is recommended to wash/wipe/disinfect the inside of the shoes so that the infection due to the microorganisms found in shoes does not develop/spread/contaminate in question (24). Since the humidity and temperature in the shoes are also factors that support the growth of microorganisms, keeping the inside of the shoes dry is important for the prevention of fungal infections (25). In order to ensure dryness, it is recommended to ventilate the shoes daily, to use the same shoes most frequently every other day, and to dry them in the sun when not in use. Not only shoes, but also the hygiene of socks, correct selection of socks and correct use of socks are also important factors. Preferring cotton socks, washing and changing them daily, and wearing them after the socks are completely dry are important topics (26). In this study, the FCBS score of those who have the habit of wiping/washing their shoes, airing and changing their socks daily was found to be higher. It can concluded said that those who care about foot care have a high awareness of the correct use of shoes and socks.

Training given to patients with health problems in their feet can produce solutions to the patient's problems (27). While it is easier for the patient to learn, develop and adapt to the situation with the education given (28,29), desired behavioral changes can be gained with self-care training and individuals can become able to apply the foot care training given (30-32) and increase their quality of life (33). While the foot care score was 49.02±10.25 in diabetic patients, it increased to 62.09±7.38 after foot care training (11). For this reason, it is recommended to establish and implement foot care protocols and to provide training accordingly (34). In order to improve the foot care behaviors of individuals, starting from the groups with low awareness, providing education will increase the awareness of the individuals about the importance of foot care and positively affect the foot care behavior.

Conclusion

It was determined that there was a relationship between the FCBS score of the patients with TP and the socio-demographic characteristics such as gender and place of residence, foot hygiene habits such as wiping/washing the inside of the shoes, airing the shoes and changing the socks daily. It was determined that women, those living in the city, those who had the habit of wiping/washing the inside of their shoes, daily airing and changing socks daily had better foot care behaviors/higher scores. The presence of smoking, chronic disease and routine drug use did not affect the foot care score.

Ethics

Ethics Committee Approval: Necmettin Erbakan University Health Sciences Scientific Research Ethics Committee (date: 06.01.2021/number: 4).

Informed Consent: Permission for use was obtained from the scale owners.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: R.B., İ.Ö., İ.Ö.Ö., Design: R.B., Y.A., İ.Ö.Ö., Data Collection or Processing: M.D., İ.Ö.Ö., İ.Ö., Analysis or Interpretation: Y.A., Literature Search: R.B., M.D., İ.Ö.Ö., Writing: R.B., M.D.

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