



Evaluation of Hand Hygiene Beliefs and Practices Among Healthcare Workers in a Training and Research Hospital

Bir Eğitim Araştırma Hastanesinde Sağlık Çalışanlarında El Hijyeni İnancı ve Uygulamalarının Değerlendirilmesi

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ABSTRACT

Objective: Hand hygiene is an essential step in preventing healthcare-associated infections. Gaining information and improving hand hygiene among healthcare workers can contribute to the prevention of nosocomial infections. Although studies in the literature emphasize hand hygiene compliance, data on hand hygiene beliefs are limited.

Methods: This study was a descriptive research among employees between May and July 2022. Data obtained from surveys called the Hand Hygiene "belief scale" and "practice inventory" administered to healthcare workers were collected.

Results: A total of 1556 healthcare workers were interviewed. As the education level increased, a significant increase was found in the belief in hand hygiene and its importance scale. Women have a higher belief in hand hygiene than men. The hand hygiene belief scale scores of healthcare workers working in outpatient clinics were higher than those of healthcare workers in the emergency room and intensive care. Compliance with hand hygiene decreases with increasing risk and workload. When the shift times were evaluated, daytime workers scored higher on the belief scale than night workers.

Conclusion: Our study revealed that hand hygiene was affected by factors such as education, profession, gender, length of service, shift time, and department. Therefore, unit-specific or individual plans are required.

Keywords: Health care associated infections, hand hygiene, hand hygiene beliefs and practices, infection control, infection

ÖZ

Amaç: El hijyeni sağlık hizmeti ilişkili enfeksiyonların önlenmesinde önemli adımlardan biridir. Sağlık çalışanlarının el hijyeni konusunda bilgilendirilmesi ve iyileştirmeler yapılması hastane enfeksiyonlarının önlenmesine katkı sağlayacaktır. Literatürde el hijyenine uyumu vurgulayan çalışmalar mevcutken, el hijyeni inançlarına ilişkin veriler sınırlıdır.

Gereç ve Yöntem: Çalışmamız Mayıs ve Temmuz 2022 tarihleri arasında tanımlayıcı bir araştırma olarak planlandı. Sağlık çalışanlarına uygulanan El Hijyeni "inanç ölçeği" ve "uygulama envanteri" adlı anketlerden elde edilen veriler toplandı.

Bulgular: Toplam 1556 sağlık çalışanıyla görüşme yapıldı. Eğitim düzeyi arttıkça el hijyenine olan inanç ve önem ölçeğinde anlamlı bir artış tespit edildi. Kadınların el hijyenine olan inancının erkeklere göre daha yüksek olduğu belirlendi. Polikliniklerde çalışan sağlık çalışanlarının el hijyeni inanç ölçeği puanları, acil servis ve yoğun bakımda çalışan sağlık çalışanlarına göre daha yüksekti. Risk ve iş yükünün artmasıyla birlikte el hijyenine uyum azalmaktaydı. Vardiya sürelerini değerlendirdiğimizde; gündüz çalışanların inanç ölçeğinde gece çalışanlarına göre daha yüksek puanları vardı.

Sonuç: Çalışmamız el hijyeninin eğitim, meslek, cinsiyet, hizmet süresi, vardiya süresi, çalışılan bölüm gibi faktörlerden etkilendiğini göstermektedir. Bu nedenle üniteye özel veya bireysel planlamaların yapılması gerekmektedir.

Anahtar Kelimeler: Sağlık bakımı ilişkili enfeksiyonlar, el hijyeni, el hijyeni inanç ve uygulamaları, enfeksiyon kontrolü, enfeksiyon

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INTRODUCTION

Hand hygiene is an essential step in preventing healthcare-associated infections. Therefore, evaluating the hand hygiene practices of healthcare professionals, identifying deficiencies, and taking regulatory steps, any improvements made to hand hygiene knowledge and processes will help prevent infections.

Although many studies in the literature emphasize hand hygiene compliance (1,2), data on hand hygiene beliefs are limited (3). The hand hygiene belief survey (4) questions the belief in the necessity of hand hygiene practice and is useful for identifying the causes of problems in hand hygiene behavior.

Our study aims to understand the beliefs and behaviors of healthcare professionals regarding hand hygiene practices and to provide guidance in establishing appropriate attitudes and practices by examining them in detail. For this purpose, the impact of descriptive factors such as age, years of service, gender, educational status, marital status, service, and professional groups of healthcare workers on hand hygiene beliefs and practices was evaluated and presented.

METHODS

This descriptive research was conducted among University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital employees between May and July 2022. The universe consisted of all hospital employees, and data were obtained from people selected through convenience sampling. The research sample comprised healthcare professionals from different departments with different levels of experience. The study complied with the principles of the Declaration of Helsinki, and approval was received from the University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital Clinical Research Ethics Committee (decision no: 2024-01-08, date: 22.01.2024).

The data obtained from the surveys called the Hand Hygiene "belief scale" and the "practice inventory" (4,5) were collected from 1556 healthcare workers who were not on leave and volunteered to participate in the research through one-on-one interviews with the participants. In the survey, 17.1% of the healthcare professionals were assistant physicians, 52.6% were nurses-medical officers-midwives, 14% were specialist doctors, and 5.9% were associate professors or professors.

During data collection, volunteers were informed that the scales should be filled out completely and carefully and that

the study data would be used only for scientific purposes. To avoid affecting healthcare professionals, the participants were asked to answer the form individually. Each healthcare worker took an average of 15 minutes to complete the form. The authors obtained informed consent from all participants in this study.

Age, years of service, department, hand hygiene practice inventory (HHPI), and hand hygiene belief scale (HHBS) were applied to healthcare workers. The HHPI and HHBS were developed by de Mortel (4) in 2009, and their validity and reliability in Turkish were established by Karadağ et al. (6). While the HHPI evaluates hand hygiene practice through a 14-item survey, the HHBS evaluates belief in hand hygiene through a 22-item survey. Both data collection tools were collected by rating and scoring the respondents' answers. The HHPI total score varies between 14-70 points, and a high score indicating compliance with hand hygiene.

In the HHBS, eight items (numbered 5, 8, 10, 16, 17, 18, 19, and 20) were reverse-scored, and the total score varied between 22 and 110. An increase in the total score indicates a positive belief in hand hygiene (6).

Statistical Analysis

Number Cruncher Statistical System 2020 (Kaysville, Utah, USA) program was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, median, first quartile, third quartile, frequency, percentage, minimum, maximum) were used to evaluate the study data. The suitability of quantitative data for normal distribution was tested using the Shapiro-Wilk test and graphical analysis. Mann-Whitney U test was used to compare two groups of quantitative variables that did not show normal distribution. Kruskal-Wallis and Dunn-Bonferroni tests were used to compare more than two groups of quantitative variables that did not show normal distribution. Spearman's correlation analysis was used to evaluate the relationships between quantitative variables. Statistical significance was set as $p < 0.05$.

RESULTS

Within the scope of the research, a total of 1556 healthcare workers, 33% (n=514) of whom were male and 67% (n=1042) of whom were female, were interviewed at University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital between May and July 2022. The ages of the participants ranged from 21 to 69 years, and the average age was 32.18 ± 9.40 . The demographic characteristics of the participants are given in Table 1. distribution of participants' answers to the HHBS questions is given in Table 2.

Table 1. Demographic characteristics

Variables	n (%)		
Gender	Male	514 (33.0)	
	Female	1042 (67.0)	
Age	Mean \pm SD	32.18 \pm 9.40	
	Median (min-max)	28 (21-69)	
Marital status	Single	944 (60.7)	
	Married	612 (39.3)	
Educational background	Literate	44 (2.8)	
	Primary education	22 (1.4)	
	Secondary education	53 (3.4)	
	License	76 (4.9)	
	Associate degree	815 (52.4)	
	Degree	351 (22.6)	
	Doctorate	195 (12.5)	
Department	Emergency department	121 (7.8)	
	Operating theater	63 (4.0)	
	Pharmacy	4 (0.3)	
	Physiotherapy	12 (0.8)	
	Laboratory	21 (1.3)	
	Audiometry	2 (0.1)	
	Out-patient clinic	164 (10.5)	
	Radiology	45 (2.9)	
	Inpatient service	496 (31.9)	
	Intensive care unit	383 (24.6)	
	Others	245 (15.7)	
	Occupation	Assistant doctor	266 (17.1)
		Associate professor/ professor	92 (5.9)
Pharmacist		4 (0.3)	
Nurse/health officer/ midwife		819 (52.6)	
Technician		36 (2.3)	
Cleaning staff		3 (0.2)	
Specialist		218 (14.0)	
Secretary		12 (0.8)	
Other		106 (6.8)	
Years of service		0-5 years	872 (56.0)
	6-10 years	203 (13.0)	
	11-15 years	130 (8.4)	
	16-20 years	121 (7.8)	
	21 years and above	230 (14.8)	
Shift hours	Only night time	67 (4.3)	
	Only daytime	522 (33.5)	
	Work in shifts	967 (62.1)	

SD: Standard deviation, min-max: Minimum-maximum

The scores of the subjects participating in the study from the "Importance" sub-dimension of the HHBS ranged from 14 to 70, with an average score of 61.85 \pm 9.32 points. The scores they received from the belief sub-dimension ranged between 8 and 40, and the average score was determined as 19.61 \pm 7.96. The total scores they received from the HHBS sub-dimensions range between 50 and 110; the average score is 81.46 \pm 9.34 (Table 3).

When the internal consistency of the HHBS was examined, for the importance sub-dimension, $\alpha=0.963$; for the belief sub-dimension, $\alpha=0.897$; and the Cronbach's alpha coefficient of the total HHBS was 0.774. Accordingly, we can conclude that our scale is reliable. The scores obtained from the responses to the HHBS were compared according to descriptive characteristics (Table 3). The scores of women from the Belief sub-dimension of the HHBS and the total scores of the scale were higher than those of men ($p=0.005$; $p=0.001$; $p<0.01$). It was found that the subscale scores of those with low education levels were lower than those with secondary education, associate degree, bachelor's degree, master's degree, and doctorate ($p=0.001$; $p<0.01$).

The scores of those working in the emergency room and intensive care unit on the belief subscale were lower than those working in other departments.

A significant difference was found between the scores of the participants from the importance sub-dimension of the HHBS according to their profession ($p=0.020$; $p<0.05$). The scores of nurses from the subscale were higher than those of staff and doctors ($p=0.020$; $p<0.05$). A difference was also detected between the scores of the participants from the belief sub-dimension of the HHBS ($p=0.037$; $p<0.05$). In this sub-dimension, the scores of the staff in this sub-dimension are significantly higher than doctors and nurses ($p=0.037$; $p<0.05$). The scores of employees with 0-5 years of experience on the subscale are significantly higher than those with 11-15 years, 16-20 years, and 21 years and above ($p=0.001$; $p<0.01$).

As a result of pairwise comparisons made to determine the source of the difference, the subscale scores of permanent night workers were significantly lower than those of shift and permanent day workers ($p=0.001$; $p=0.001$; $p<0.01$). Table 4 presents the distribution of participants' answers to the HHPI scale questions. There is no significant differences in the participants' total scores in the HHPI regarding gender, age, marital status, educational status, department they worked in, profession, length of service, and shift hours ($p>0.05$) (Table 5). A relationship was also detected between the participants' ages and their total HHBS scores (as age increased, the total score from the HHBS increased) ($p=0.019$; $p<0.05$).

Table 2. Distribution of participants' answers to hand hygiene belief scale questions

	I strongly disagree		I disagree		I am not sure		I agree		Absolutely, I agree	
	n	%	n	%	n	%	n	%	n	%
Hand hygiene training is an important part of the curriculum.	17	1.1	19	1.2	79	5.1	398	25.6	1043	67.0
The importance of hand hygiene is emphasized in the service where I practice clinically.	20	1.3	18	1.2	96	6.2	487	31.3	935	60.1
My clinical consultant/service chief emphasized the importance of hand hygiene.	21	1.3	23	1.5	99	6.4	493	31.7	920	59.1
I have a responsibility to be a role model for other healthcare professionals.	22	1.4	25	1.6	102	6.6	507	32.6	900	57.8
When my workload is heavy, completing my duties is more important than paying attention to hand hygiene.	444	28.5	273	17.5	126	8.1	423	27.2	290	18.6
Performing hand hygiene is recommended situations may reduce the patient mortality rate.	30	1.9	36	2.3	115	7.4	518	33.3	857	55.1
Performing hand hygiene when indicated may reduce costs associated with hospital-acquired infections.	21	1.3	15	1.0	94	6.0	499	32.1	927	59.6
Because patients' needs take priority, I cannot always perform hand hygiene in the recommended situations.	422	27.1	276	17.7	223	14.3	409	26.3	226	14.5
Preventing nosocomial infections is an important part of the role of healthcare professionals.	23	1.5	20	1.3	89	5.7	474	30.5	950	61.1
I take the behavior of experienced healthcare professionals as an example when it comes to performing hand hygiene.	768	49.4	517	33.2	139	8.9	92	5.9	40	2.6
An infectious disease contracted in healthcare institutions may threaten my life or career.	23	1.5	22	1.4	113	7.3	527	33.9	871	56.0
I believe that I have the power to change wrong/bad practices in the work environment.	38	2.4	38	2.4	184	11.8	551	35.4	745	47.9
Failure to maintain hand hygiene may be considered negligence in indicated situations.	36	2.3	31	2.0	191	12.3	611	39.3	687	44.2
Hand hygiene is a habit for me in personal life.	20	1.3	9	0.6	113	7.3	514	33.0	900	57.8
I am confident that I can effectively apply my knowledge of hand hygiene in my clinical work.	23	1.5	9	0.6	120	7.7	542	34.8	862	55.4
Remembering to perform hand hygiene in recommended situations requires effort.	678	43.6	549	35.3	158	10.2	120	7.7	51	3.3
It would bother me to warn a healthcare professional about hand washing.	504	32.4	433	27.8	268	17.2	246	15.8	105	6.7
Providing hand hygiene slows down the build-up of immunity against diseases.	458	29.4	313	20.1	213	13.7	376	24.2	196	12.6
Dirty sinks may be a reason not to wash hands.	430	27.6	352	22.6	304	19.5	326	21.0	144	9.3
Lack of a suitable cleaning product can be a reason for not cleaning hands.	444	28.5	442	28.4	267	17.2	276	17.7	127	8.2
Providing hand hygiene after caring for a wound can protect against infections.	26	1.7	23	1.5	121	7.8	549	35.3	837	53.8
Cleaning hands after going to the toilet reduces the risk of transmitting infectious diseases.	24	1.5	9	0.6	118	7.6	477	30.7	928	59.6

Table 3. Hand hygiene belief scale scores according to descriptive characteristics

		Importance		Belief		Total score	
		Mean ± SD	Median (min-max)	Mean ± SD	Median	Mean ± SD	Median (min-max)
Gender	Male	(min-max)	Mean ± SD	Median	19 (8-40)	79.7±9.44	78 (54-103)
	Female	(min-max)	64 (14-70)	20.01±7.85	21 (8-40)	82.33±9.18	80 (50-110)
	p-value	*0.027*		*0.001**		*0.599	
Educational background	Literate	63.77±12.95	70 (14-70)	12.84±8.57	8 (8-40)	76.61±6.77	78 (54-100)
	Primary education	46.32±11.7	47 (16-70)	22±7.15	24 (8-40)	68.32±6.03	70 (52-78)
	Secondary education	60.77±8.03	61 (42-70)	20.34±6.83	21 (8-36)	81.11±9.4	78 (66-106)
	License	61.46±7.77	62 (42-70)	18.78±6.95	20 (8-31)	80.24±7.4	79 (64-99)
	Associate degree	62.35±7.9	64 (14-70)	19.75±7.68	21 (8-40)	82.1±8.88	80 (50-110)
	Degree	62.4±9.37	66 (14-70)	19.8±8.1	22 (8-40)	82.21±9.36	80 (54-105)
	Doctorate	60.52±12.31	65 (14-70)	20.07±8.76	20 (8-40)	80.59±11.09	78 (54-104)
p-value	^b0.001**		^b0.001**		^b0.001**		
Department	Emergency department	62.03±8.44	65 (14-70)	18.26±7.62	17 (8-40)	80.29±9.22	78 (54-105)
	Operating theater	62.14±8.85	66 (41-70)	19.08±8.13	21 (8-33)	81.22±9.25	78 (66-103)
	Phsiotherapy	58.33±17.26	65.5 (14-70)	23.08±7.6	23 (8-40)	81.42±13.24	86 (54-93)
	Laboratory	63.9±6.12	66 (45-70)	22.95±8.41	25 (8-36)	86.86±8.67	87 (69-104)
	Out-patient clinic	61.77±8.01	63 (14-70)	21.05±7.72	23 (8-40)	82.83±9.33	81 (54-103)
	Radiology	61.09±9.75	62 (33-70)	20.29±7.93	22 (8-32)	81.38±9.26	80 (60-101)
	Inpatient service	62.43±8.38	65 (14-70)	19.79±7.7	21 (8-40)	82.22±9.18	80 (54-109)
	Intensive care unit	62.16±9.46	66 (14-70)	18.56±7.92	20 (8-40)	80.72±8.93	78 (50-106)
Others	60.25±11.48	62 (14-70)	20.15±8.5	22 (8-40)	80.4±9.96	79 (52-110)	
p-value	^b0.462		^b0.003**		^b0.062		
Occupation	Medical doctor	61.88±10.13	66 (14-70)	19.14±8.37	20 (8-40)	81.02±9.85	78 (52-109)
	Nurse	62.36±7.92	64 (14-70)	19.65±7.61	21 (8-40)	82.02±8.79	80 (50-110)
	Other staff	59.13±12.11	61 (14-70)	21.12±7.99	23 (8-40)	80.25±10.06	79 (54-104)
	p-value	^b0.020*		^b0.037*		^b0.055	
Years of service	0-5 years	62.72±8.24	65 (14-70)	18.63±7.72	20 (8-40)	81.35±8.56	78 (50-109)
	6-10 years	61.1±9.4	63 (14-70)	19.5±7.75	21 (8-40)	80.6±9.86	78 (54-103)
	11-15 years	60.39±11.32	63.5 (14-70)	21.37±7.91	23 (8-40)	81.76±10.79	80.5(54-105)
	16-20 years	61.24±9.53	64 (14-70)	21.62±7.71	24 (8-40)	82.86±10.05	82 (54-104)
	21 years and above	60.35±11.26	62 (14-70)	21.4±8.53	24 (8-40)	81.75±10.41	80 (54-110)
p-value	^b0.060		^b0.001**		^b0.068		
Shift hours	Only night time	57.73±11.08	56 (30-70)	19.52±7.38	21 (8-32)	77.25±9.4	76 (58-97)
	Only daytime	62.55±8.3	65 (14-70)	20.31±8.05	22 (8-40)	82.85±9.14	81 (54-110)
	Work in shifts	61.76±9.64	65 (14-70)	19.25±7.93	20 (8-40)	81.01±9.33	78 (50-109)
	p-value	^b0.005**		^b0.018*		^b0.001**	

SD: Standard deviation, min-max: Minimum-maximum, *Mann-Whitney U test, ^bKruskal-Wallis test & Dunn-Bonferroni test, **p<0.01, *p<0.05

DISCUSSION

In general, our study revealed that, as in similar studies (1), the attitudes and beliefs of healthcare professionals regarding hand hygiene differed depending on their education level, profession, and department. Women had

a higher belief in hand hygiene than men. In the study conducted by Sax et al. (7), female gender was a positive factor in compliance with hand hygiene. As the education level increased, a significant increase was found in the belief in hand hygiene and its importance scale. As expected, healthcare professionals with higher education levels had

a better perception of hand hygiene. Other studies on the subject (8,9) have also shown that the attitudes and beliefs of healthcare professionals regarding hand hygiene are affected by factors such as education level and profession.

Our results demonstrate that the HHBS of healthcare professionals working in outpatient clinics differs from those working in emergency rooms and intensive care units. It has also been reported in other studies (10) that stressful environments and intense workloads cause negative attitudes toward hand hygiene. The large number of patients, limited time, and the need to intervene quickly in the emergency department may have reduced the employees' belief in hand hygiene. In a previous study, compliance with hand hygiene decreased significantly when more than 30 hand hygiene procedures were required per hour (11). Compliance with hand hygiene is reduced with increased risk and workload for patients.

Those with short work experience have higher belief scale scores than those with longer work experience. This may be attributed to the fact that those with long-term work experience are overwhelmed by the workload. In contrast, those with fewer years of working experience may have new and more dynamic knowledge about hand hygiene. When the shift times were evaluated, daytime workers scored higher on the belief scale than night workers. This may be due to the small number of healthcare workers at night, who are exhausted and work without sleep. An increase in workload at night may explain the difference in the scale scores. Studies on hand hygiene compliance have shown that hand hygiene compliance is significantly affected by diurnal working hours. Despite continuing education and hand hygiene guidelines emphasizing the importance of hand hygiene, hand hygiene compliance remains low among healthcare personnel during night shifts (12). The fact that the education level and professional level of healthcare professionals affect their attitudes and beliefs about hand hygiene makes it important to consider this when preparing theoretical and practical training programs and to individualize the employees in a way that suits their level and meets their unique needs and beliefs (1,3,4,6,7,13-15).

Although education and profession play a role in shaping the attitudes and beliefs of healthcare professionals regarding hand hygiene, other influential factors should not be ignored. Some studies have suggested that the effectiveness of hand hygiene training programs does not depend solely on the education level of healthcare professionals (16). Increasing knowledge about hand hygiene may not necessarily mean improving handwashing

practices (17). Sax et al. (7) suggested that not only education but also a combination of strategic interventions are required to increase compliance with hand hygiene. This result indicates that education and profession are not the only determinants of effective hand hygiene practices among healthcare professionals. It is essential to consider a multifaceted approach that includes education and training programs and behavior change strategies to promote and maintain good hand hygiene practices in healthcare settings.

When developing hand hygiene training programs for healthcare professionals, many factors must be considered and adapted to specific needs and beliefs. It is necessary to recognize that education alone may not be sufficient to encourage behavioral change and improve hand hygiene practices (5,18,19). Behavioral sciences could also be used to increase healthcare workers' compliance with infection control practices. Behavior change can be achieved by knowing that behavior is affected by more than one level of influence and that it affects and is affected by the social environment (20).

Since improvement efforts in hospitals are perceived as an addition to existing workloads, healthcare workers may exhibit resistance to hand hygiene practices. It may be recommended to find good role models among leaders and colleagues, to use supervision and feedback, and to use visual and auditory reminders of hand hygiene in the workplace (21). An ergonomic structure should be improved in hospital environments, and access to sinks and disinfectants should be provided. Some institutions have also achieved improved compliance through structured training programs and easy access to hand hygiene products (22). Overall, the findings of this study provide insight into healthcare professionals' beliefs and experiences regarding hand hygiene and promote a culture of effective hand hygiene practices in healthcare settings.

Study Limitations

The fact that the study was conducted in a single center is a limitation of the study.

CONCLUSION

Our study presents data on healthcare workers' beliefs and practices regarding hand hygiene, which is crucial for patient safety and infection control. The results show that hand hygiene is affected by factors such as education level, profession, gender, length of service, shift time, and department. It should be remembered that various factors may affect compliance and belief, and it is recommended

that these factors be considered when preparing compliance programs. Healthcare institutions may need to develop practices by determining their needs and making unit-specific or individual adaptation plans. Additionally, our findings contribute to our understanding of the staff working in tertiary hospitals in our country and could be a guide for other healthcare institutions.

ETHICS

Ethics Committee Approval: The study complied with the principles of the Declaration of Helsinki, and approval was received from the University of Health Sciences Türkiye, Bakırköy Dr. Sadi Konuk Training and Research Hospital Clinical Research Ethics Committee (decision no: 2024-01-08, date: 22.01.2024).

Informed Consent: The authors obtained informed consent from all participants in this study.

Authorship Contributions

Surgical and Medical Practices: A.İ.S., S.B.K., Ö.P., K.K.Y., Concept: A.İ.S., Ş.N.K., Y.E.Ö., S.B.K., K.K.Y., Design: A.İ.S., Ş.N.K., Y.E.Ö., D.B., S.B.K., Ö.P., K.K.Y., Data Collection or Processing: A.İ.S., D.B., S.B.K., Ö.P., K.K.Y., Analysis or Interpretation: A.İ.S., Ş.N.K., Y.E.Ö., D.B., K.K.Y., Literature Search: A.İ.S., Ş.N.K., Y.E.Ö., S.B.K., K.K.Y., Writing: A.İ.S., Ş.N.K., Y.E.Ö., D.B., K.K.Y.

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