

# The Prevalence of Low Back Pain and Risk Factors Among Nurses Working in a University Hospital: A Cross Sectional Study

## *Bir Üniversite Hastanesinde Çalışan Hemşirelerde Bel Ağrısı Görülme Sıklığı ve Risk Faktörleri: Kesitsel Çalışma*

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### Keywords

Low back pain, nurses, musculoskeletal diseases, occupational health, occupational safety

### Anahtar Kelimeler

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### Abstract

**Objective:** Aim of the study is to determine the incidence of low back pain (LBP) and risk factors in nurses working in a university hospital.

**Materials and Methods:** This cross-sectional study was conducted in 253 nurses working in a university hospital. The data were collected by questionnaire. The questionnaire form has two parts. First part includes demographics, work related risk factors, presence/severity of LBP, factors that cause LBP and training in using low back at work. Second part includes Oswestry Disability index (ODI). Descriptive statistics are presented as number, percentage, median (minimum-maximum). Chi-square test, binominal logistic regression analysis was used for analysis.

**Results:** The prevalence of ongoing LBP is 21.1%. According to the ODI score, mild disability was found in 44.9%. The percentage of nurses who have been trained in using back exercises at work is 32.8%. The prevalence of LBP was higher among the elderly, married ones, nurses with trauma stories, pregnancy stories, daytime workers and nurses who worked for more than 10 years ( $p<0.001$ ). Trauma story and working more than 10 years in profession increase the risk ( $p<0.05$ ).

**Conclusion:** Health workers, especially nurses, should be educated about awareness of risk factors at work, using of low back at work and trainings on simple exercises that can be done at work; the working conditions of nurses should be revised in line with the risk factors; ergonomic working environment should be provided. With these approaches, health workers' life quality can be increased and the loss of work power caused by pain will be minimized and financial losses will be prevented.

### Öz

**Amaç:** Bu çalışmada bir üniversite hastanesinde çalışan hemşirelerde bel ağrısı görülme sıklığı ve risk faktörlerinin belirlenmesi amaçlanmıştır.

**Gereç ve Yöntemler:** Çalışma kesitsel tipte olup, bir üniversite hastanesinde çalışan 253 hemşirede gerçekleştirilmiştir. Veriler anket ile toplanmıştır. Anketin ilk bölümünde sosyo-demografik özellikler, bel ağrısı risk faktörleri, mevcut bel ağrısı durumu/şiddeti ve bel ağrısını ortaya çıkaran etmenler, iş yaşamında bel mekaniğini kullanma konusunda eğitim alma durumu sorgulanmıştır. İkinci

bölümde ise Oswestry Bel Ağrısı Ölçeği (OBAÖ) kullanılmıştır. Analitik değerlendirmede "ki-kare testi, binominal lojistik regresyon analizi" kullanılmıştır.

**Bulgular:** Halen devam eden bel ağrısı prevalansı %21,1'dir. OBAÖ'ye göre %44,9'unda hafif engellilik saptanmıştır. İş yaşamında bel mekaniğini kullanma konusunda eğitim alan %32,8'dir. İleri yaşta olanlarda, evlilerde, gebelik öyküsü, travma öyküsü olanlarda, gündüz çalışanlarda, meslekte çalışma süresi 10 yıldan fazla olanlarda bel ağrısı görülme sıklığının fazla olduğu saptanmıştır ( $p<0,001$ ). Travma öyküsü ve meslekte 10 yıldan fazla çalışmanın riski artırdığı izlenmiştir ( $p<0,05$ ).

**Sonuç:** Özellikle hemşireler başta olmak üzere sağlık çalışanlarına iş yerlerinde bel bölgesi problemlerine neden olan risk faktörleri ve iş yaşamında bel mekaniğini kullanmayla ilgili farkındalık eğitimleri düzenlenmeli, iş yerinde yapılabilecek basit egzersizler hakkında eğitimler verilmeli, kişilerin çalışma koşulları risk faktörleri doğrultusunda revize edilmeli, ergonomik çalışma ortamları sağlanmalıdır. Bu yaklaşımlarla sağlık personelinin yaşam kalitesini artırılabilceği gibi, ağrının yol açtığı iş gücü kaybı en aza indirilecek, mali anlamda kayıplar önlenecektir.

## Introduction

Musculoskeletal system disorders including low back pain are among the most common chronic diseases. According to studies, 70-85% of people experience low back pain at some point in their lives (1). Low back pain was among the top four leading causes of disability in the 2010 global burden of disease study (2). According to the studies conducted in Turkey, the prevalence of low back problems (low back pain, hernia etc.) is 33% in all population (3) and 44-79% in nurses (4). According to the 2015 Health Statistics Yearbook, low back problems take the top position within the five disorders that people of both sexes experience in Turkey (3).

According to the data obtained from the Turkish Statistics Institute, musculoskeletal disorders constitute 24.9% of occupational health problems (5). Studies from Europe declared that 40% of the amount of compensation received by workers is due to musculoskeletal system disorders and related medical expenses constitute 1.6% of the gross national products. Cost analyses of low back pain carried out in developed countries, indicated a high level of financial burden of low back pain (6-9). The study of Icgasioglu et al. (9) which was the first study about the cost analysis of low back pain in Turkey showed that the total direct cost of chronic low back pain was 714.734 TL (Turkish liras) and 1.080 TL per person in 2014. In the same study, total indirect cost of chronic low back pain was 3.648.057 and 5.511 TL per person (9). In the above mentioned study, the financial burden caused by absenteeism was not included in the calculation; only disease related costs were calculated. If loss of man-hours were included in the calculation, the cost would increase significantly.

Occupational musculoskeletal system disorders are the most common occupational diseases among

healthcare professionals (10). Therefore, many studies on this subject have been conducted in healthcare professionals. Nurses, in their daily work are exposed to different risk factors related with low back pain as a result of their nature of work such as patient care, positioning patients, patient transfer, standing for long hours etc. The prevalence of low back pain among nurses was found to be 62.9% in a study conducted in 2176 nurses in Germany and this percentage was 72% in the study of Shieh S.H. et al. (11) and 84% in the study of Arasan F. et al. (12). A study found that 11% of nurses leave their work due to low back pain (13).

Due to long term negative effects on health and associated financial burden of low back pain, it is important to develop an intervention program to identify the extent and causes of low back problems in nurses who are exposed to occupational risks and include ergonomic arrangements to eliminate such problems. Therefore the aim of this study was to determine the frequency of low back pain in nurses working in Aydın Adnan Menderes University Research and Training Hospital and associated risk factors.

## Materials and Method

This is a cross sectional study. The population of the study was the nurses working in the inpatient units, intensive care, dialysis, outpatient clinics in Aydın Adnan Menderes University Research and Training Hospital. The study sample size is 384, with alpha 5%, power 80%, sample error 0.03 and prevalence 50%. Out of targeted 384 people we managed to reach to 65.8% (253) due to various reasons such as maternity leave, annual leave, and rejection to participate to the study. Non-interventional Clinical Research Ethics Committee of the University approved the study which protocol number 2016/809. Participation in the study is based on volunteerism.

Participants completed the questionnaire between March 2016 - May 2016. Participants completed the assessment questionnaires in their free time. The questionnaire consists of two sections with a total of 27 items. Socio-demographics questions (age, sex, weight, height, education, marital status), questions on low back pain risk factors (pregnancy, economic status, department in the hospital, how many years working as a nurse, working time, smoking habits, familial tendency), low back pain experience, ongoing low back pain/severity and factors causing low back pain, treatment and therapy for low back pain, and education on using back supports during work were included in the first section. Oswestry Disability index (ODI) (14,15) was used in the second section of the questionnaire. Low back pain was expressed as persistent, ongoing low back pain (whole day pain for minimum two weeks, which requires treatment).

The ODI was developed to assess functionality; the validity and reliability study of the Turkish version was done by Yakut et al. (16). The scale consists of 10 sections that question pain severity, personal care, weight lifting, walking, sitting, standing times, sleep, sex life, social life, travelling and each section has 6 questions. Each section has a separate scoring on a scale of 5 points. The scale is evaluated based on the total score and minimum score is 0 whereas maximum score is 50. Zero - four points are no disability, 5-15 points are mild disability; 15-24 points are moderate disability; 25-25 points are severe disability and 35-50 points are full disability.

Statistical evaluation of data was done by the SPSS program. Descriptive statistics were presented as numbers, percentage and median (minimum-maximum) values. Kolmogorov-Smirnov test was used as a goodness of fit test for normal distribution; and the chi-square test was used for analytic evaluations; and binary logistic regression analysis was used for independent risk factors with a significant relationship with the prevalence of low back pain and Backward-Wald method was used for modelling. The results of logistic regression analysis were showed as relative risk [odds ratio (OR)] and 95% confidence interval (CI). Hosmer-Lemeshow test for goodness of fit of a logistic regression model was used. Type 1 error level was 0.05.

## Results

From total of 253 nurses, 89.3% of them was female (n=226) and the median age of all nurses was 26 (18-54). Median height of the participants was 165 cm (150-196), median weight was 63 kg (40 kg-111 kg); median body mass index was 23.0 kg/m<sup>2</sup> (15.6 kg/m<sup>2</sup> - 39.1 kg/m<sup>2</sup>). 53.8% of the participants were single and 58.9% had a bachelor's degree. 59.7% of the nurses reported that they had a "balanced budget". 31.6% of the nurses participated in the study (n=80) had a pregnancy history and the median number of pregnancies was 2 (0-5). 35.6% of the participants were smokers.

Among all of the participants 66.3% of them were nurses who working in the inpatient wards, 19.0% were working in the intensive care unit, 8.7% were working in the outpatient clinics and 6.0% were working in the operating room. The median employment time of the participants was 46 months (3 months - 389 months); median weekly working time was 45 hours (36 hours - 56 hours) and 64.5% of the participants were working in the night shift.

Regarding the general health stats of the participants 13.4% of them had chronic diseases which required continuous use of medications and the majority of such diseases were endocrine disorders. 15.5% of the nurses reported that they exercised for minimum 45 minutes three times a week. 32.8% of the nurses (n=82) reported that they received training on using low back supports during work.

Lifetime prevalence of severe low back pain problem was 28.2% (n=71) and ongoing low back pain problem was 21.1% (n=52). The median duration for ongoing low back pain was 12 months (1 month - 240 months). 62.8% of the nurses reported low back history in their families.

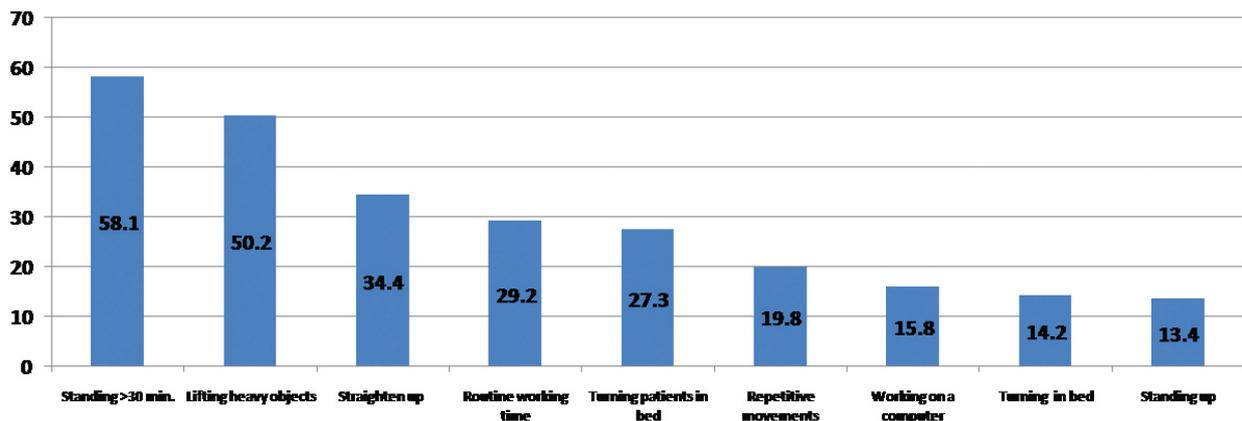
The distribution of factors affecting low back pain in nurses is shown in Table 1.

Univariate analyses showed that age, marital status, low back pain history in the family, pregnancy history, past traumas, working conditions and employment time influenced the frequency of low back pain. According to this, as age and employment time increases, the prevalence of low back pain also increases. Low back pain was observed more frequently in married nurses, nurses who had low back pain history in their families, trauma history and in those who worked only in day shifts (Table 1).

<b>Table 1. The distribution of risk factors affecting low back pain</b>				
<b>Risk factors</b>	<b>With low back pain n, (%)</b>	<b>No low back pain n, (%)</b>	<b>Total</b>	<b>p</b>
<b>Socio-demographics</b>				
<b>Age</b>				
≤25	12 (10.1%)	107 (89.9%)	119 (100%)	<b>&lt;0.001</b>
26-30	10 (20.4%)	39 (79.6%)	49 (100%)	
31-35	8 (33.3%)	16 (66.7%)	24 (100%)	
36-40	9 (32.1%)	19 (67.9%)	28 (100%)	
≥41	13 (48.1%)	14 (51.9%)	27 (100%)	
<b>Sex</b>				
Women	49 (22.5%)	169 (77.5%)	218 (100%)	0.173
Men	3 (11.1%)	24 (88.9%)	27 (100%)	
<b>Marital status</b>				
Single	15 (11.2%)	119 (88.8%)	134 (100%)	<b>&lt;0.001</b>
Married	33 (33.0%)	67 (67.0%)	100(100%)	
Divorced	4 (36.4%)	7 (63.6%)	11 (100%)	
<b>Education</b>				
High school	6 (13.3%)	39 (86.7%)	45 (100%)	0.051
Associate's degree	4 (10.5%)	34 (89.5%)	38 (100%)	
Bachelor's degree	36 (24.8%)	109 (75.2%)	145 (100%)	
Master's degree	6 (35.3%)	11 (64.7%)	17 (100%)	
<b>Health habits</b>				
<b>Smoking history</b>				
Non-smokers	36 (22.6%)	123 (77.4%)	159 (100%)	0.461
Smokers (occasional or every day)	16 (18.6%)	70 (81.4%)	86 (100%)	
<b>Low back pain history in family</b>				
Yes	42 (27.3%)	112 (72.7%)	154 (100%)	<b>0.003</b>
No	10 (11.1%)	80 (88.9%)	90 (100%)	
<b>Pregnancy history</b>				
Yes	26 (34.2%)	50 (65.8%)	76 (100%)	<b>0.002</b>
No	23 (16.0%)	121 (84.0%)	144 (100%)	
<b>Trauma history</b>				
Yes	17 (44.7%)	21 (55.3%)	38 (100%)	<b>&lt;0.001</b>
No	35 (16.9%)	172 (83.1%)	207 (100%)	
<b>Regular exercise (minimum 45 minutes for 3 times a week)</b>				
Yes	6 (11.3%)	46 (88.5%)	52 (100%)	0.331
No	33 (17.1%)	160 (82.9%)	193 (100%)	
<b>BMI</b>				
Overweight ≥30	4 (28.6%)	10 (71.4%)	14 (100%)	0.503
Normal weight <30	46(20.7%)	176 (79.3%)	222 (100%)	
<b>According to working conditions</b>				
<b>Department</b>				
Intensive care unit	8 (20.0%)	32 (80.0%)	40 (100%)	0.783
Operating room	4 (28.6%)	10 (71.4%)	14 (100%)	
Other	40 (21.1%)	150 (78.9%)	190 (100%)	

Table 1 continued

<b>Work shifts</b>				
Day	25 (32.1%)	53 (67.9%)	78 (100%)	<b>0.016</b>
Night	2 (22.2%)	7 (77.8%)	9 (100%)	
Day + night	25 (15.8%)	133 (84.2%)	158 (100%)	
<b>Daily working time</b>				0.272
≤8 hours	31 (25.2%)	92 (74.8%)	123 (100%)	
8-12 hours	4 (19.0%)	17 (81.0%)	21 (100%)	
≥12 hours	17 (16.5%)	86 (83.5%)	103 (100%)	
<b>Employment time</b>				<b>&lt;0.001</b>
≤1 year	3 (15.8%)	16 (84.2%)	19 (100%)	
1-5 years	14 (11.5%)	108 (88.5%)	122 (100%)	
6-10 years	13 (27.1%)	35 (72.9%)	48 (100%)	
≥10 years	22 (37.9%)	36 (62.1%)	58 (100%)	
<b>Financial status</b>				0.744
Income is less than expenses	16 (20.0%)	64 (80.0%)	80 (100%)	
Balanced budget or income is more than expenses	36 (21.8%)	129 (78.2%)	165 (100%)	
BMI: Body mass index				



Graphic 1. Contributing factors for low pain

When contributing factors for low back pain were investigated, nurses reported that they had low back pain the most when they stand longer than 30 min. (58.1%), when they lift heavy objects/people (50.2%), when they straighten up after bending down (34.4%) (Graphic 1).

Logistic regression analysis was done to determine the possible risk factors that increase low back pain frequency. In this analysis, presence of ongoing low back pain problem was taken as dichotomous variable whereas age, marital status, low back pain history in the family, pregnancy history, past traumas, working

conditions and employment time were taken as independent variables. In the analysis, trauma history increased low back pain frequency by 2.66 times (OR: 2.66, 1.14-6.23) and employment time longer than ten years by 2.99 times (OR: 2.99, 1.11-6.13). Table 2 shows last step outputs of logistic regression analysis.

The median score in ODI was 6 (0-27). When the distribution of nurses according to the ODI was examined, 44.9% had a mild disability; there was only one person with a severe disability according to the scale (Table 3).

**Table 2. Study of low back pain risk factors with logistic regression analysis**

	OR (95% CI) (n=235)	p
Trauma history Yes No*	2.66 (1.14-6.23)	<b>0.023</b>
Low back pain history in family Yes No*	2.08 (0.95-4.55)	0.066
Employment time ≤10 years* >10 years	2.99 (1.50-5.98)	<b>0.002</b>

CI: Confident interval, OR: Odds ratio  
\*: Reference group  
Hosmer-Lemeshow test for goodness of fit test  $\chi^2=0.966$ ,  $p=0.915$

**Table 3. Distribution of nurses according to Oswestry Disability Index**

Scale scores	Number (n)	Percentage (%)
No disability (0-4)	71	45.5
Mild (5-14)	70	44.9
Moderate (15-24)	14	9.0
Severe (25-34)	1	0.6
Full (35-50)	0	0.0
Total	152	100

## Discussion

There are many studies on the prevalence of low back pain in nurses both in Turkey and in other countries in the world. The prevalence of low back pain changes between 44% to 79 % in the studies published in Turkey (4). In this study which prevalence and contributing factors of low back pain in nurses were investigated, ongoing low back pain was found in 21.1% of the nurses; This percentage is lower than the findings of similar studies conducted in Turkey. In the studies on the prevalence of low back pain in nurses worldwide, the prevalence was 75% in Greece (17), 73-76% in Germany (18), 64% in Switzerland (19), 29% in the USA (20). The reason for this could be that in this study only ongoing low back pain complaints were asked instead of any experience of low back pain during whole life period. Although the nurses in our study group was younger and had shorter employment time, the fact that one out of five nurses had this problem indicates that this is not a problem that can be ignored.

Low back pain which is the most common occupational disease has a high prevalence among nurses especially due to working conditions. In the study of Solak Kabataş et al (21), in which they investigated the prevalence of low back pain in healthcare professionals, nurses and midwives had higher ODI scores. Standing for extended periods of time, short breaks, physically poor work conditions, lack of sleep during night shifts were among the contributing factors of low back pain (22). The study suggested that as a result of their activities such as positioning and lifting patients during patient care they strained and injured their low back muscles and thus had low back problems (23). In this study, contributing factors to low back pain as reported by the participants were standing for extended periods of time, lifting heavy items, moving and positioning patients in bed. These types of movements are physically challenging for people; if musculoskeletal system is not relaxed with simple exercises and sufficient amount of breaks, this can cause low back pain and associated health problems.

When the prevalence of low back pain in nurses according to the departments they work was examined, although no statistical significance was found, there were some studies in the literature with statistical significance (12,24). In the study of Çil Akıncı et al. (24) the prevalence of low back pain in nurses working in the emergency department, operating rooms and intensive care units was higher than those working in other departments (25,26). In the departments such as intensive care units, operating rooms, emergency departments where some activities of the staff may challenge them physically, low back problems are more likely to be seen. The reason why there was no difference between departments in our study could be that the participants were young and had a short employment time. All members of the staff and especially nurses working in these departments should receive information and training on ergonomics approach.

Work shifts of nurses were also a contributing factor for low back pain in our study. The prevalence of low back pain in nurses working in day shift was higher. The reason for this could be that hospital work load is more during the day and therefore nurses have to stand for longer times during the day shift.

In our study it was observed that as age and employment time increase, the prevalence of low back pain also increases. Those who have been employed for over ten years were found to have more low back pain. Although there are studies in Turkey and in other countries with contrary findings (27,28), there are also studies that support this finding (11,12,24,29).

It is possible to say that one of the most important contributing factors for low back pain is personal factors. Age is an important risk factor and in many studies it was observed that low back pain increased significantly after the third decade (12,30,31). In our study, age related findings support the above. The study of Cimbiz et al. (32), found that an increase of one unit in age increased the low back pain occurrence risk by 3.2%.

Several studies found that the gender of the patient had no statistically significant effect on the prevalence of low back pain (27,28); and the findings of our study also support this. However, there are studies in the literature which suggest that the prevalence of low back pain is higher in women than in men (21,33). According to the 2015 Healthcare Statistics Yearbook, the prevalence of low back problems was higher in women than men with 39.3% of women having low back problems (3). The reason why low back pain prevalence is higher in women is that hormonal factors, pregnancy define pain symptoms more in the literature (33,34). Since this study included nurses, the study group consisted mostly of women. Therefore this can be the reason why there is no significant difference between genders.

The effect of marital status on the prevalence of low back pain has been investigated in many studies but no clear opinion has been reached. There are studies which claim that marital status has no effect on the prevalence of low back pain (11,21,27,28), but there are also studies which demonstrate the opposite just like our study (12,24).

In our study, the percentage of pregnancy history in nurses with low back pain was high and statistically significant. During pregnancy, pre and postdelivery the prevalence of low back pain caused by hormonal and mechanic effects on the low back and pelvis area increases (35). In the literature, there are studies which found a significant relationship between pregnancy and the prevalence of low back pain (36,37); as well as studies with the opposite finding (12,27).

The low back area is the area which is most affected area of the musculoskeletal system by mechanical stress, functional tension, occupational and sports trauma (38). In the study of Karamehmetoğlu et al. (39) which examined the relationship between trauma and low back pain, 27.4% of the reasons that induce low back pain was trauma and heavy lifting, twisting and falls were the main reasons to induce traumatic low back pain. Trauma history which was significantly related with the prevalence of low back pain in our study was asked in a way to determine whether the participants have had any trauma but the trauma details were not asked. This is one of the limitations of our study.

In our study, people who had low back pain history in their family had a high prevalence of low back pain; the findings of the study of Altnel (27) also support our findings. Especially family history of low back pain caused by rheumatoid arthritis is a major risk factor (40). In addition to this, incorrect movement patterns learned within the family can cause low back pain.

## Conclusion

Low back problems which are the common reason to consult to a physician are also among the top occupational diseases and that's why it has been widely researched both in Turkey and in other countries. Risk factors which were found to be significant in the univariate analyses were analysed with the multivariate modeling method. According to multivariate analysis results, ongoing low back pain was significantly affected by trauma history and employment time of longer than ten years.

Healthcare professionals, especially nurses, should be educated about awareness of risk factors at work, using of low back at work and trainings on simple exercises that can be done at work; the working conditions of nurses should be revised in line with the risk factors; ergonomic working environment should be provided. According to the "occupational health and safety" practices, healthcare professionals with a trauma history or who has been working longer than 10 years can be transferred to more suitable departments and to positions with less active work. With these approaches, the life quality of healthcare professionals can be increased and absenteeism and presenteeism can be reduced and thus financial losses can be prevented.

One of the strengths of the study is high low back pain prevalence was found despite the study done in a hospital with very young nurse population. It can be predicted that the problem will be higher in other health institutions with elderly healthcare professionals, especially for nurses. In addition; it is thought that our research will contribute to health and safety related practices in the hospital.

### Ethics

**Ethics Committee Approval:** The study were approved by the Aydın Adnan Menderes University of Local Ethics Committee (protocol number: 2016/809).

**Informed Consent:** Consent form was filled out by all participants.

**Peer-review:** Externally and internally peer-reviewed.

### Authorship Contributions

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

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