ÖZGÜN ARAŞTIRMA ORIGINAL RESEARCH

Med J SDU / SDÜ Tıp Fak Derg ▶ 2023:30(4):688-696 doi: 10.17343/sdutfd.1371829

EFFECT OF DISTRACTION METHODS ON ACUTE PAIN IN ADULTS: RANDOMIZED CONTROLLED TRIAL

YETİŞKİNLERDE DİKKATİ BAŞKA YÖNE ÇEKME YÖNTEMLERİNİN AKUT AĞRI ÜZERİNDEKİ ETKİSİ: RANDOMİZE KONTROLLÜ ÇALIŞMA

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Cite this article as: Çamlıca T, Eti Aslan F. Effect of Distraction Methods on Acute Pain in Adults: Randomized Controlled Trial. Med J SDU 2023; 30(4): 688-696.

Öz

Amaç
Bu araştırma, yetişkin hastaların kan alma işlemi sırasında yaşadığı ağrıyı tespit edebilmeyi; görsel ve işitsel yöntemlerin rutin kan alma uygulamasına kıyasla ağrı düzeyi üzerindeki etkisini ortaya koymayı amaçlamaktadır.

Gereç ve Yöntem
Araştırma, randomize kontrollü bir çalışma olarak yürütüldü. 15.01.2022 tarihinde bir üniversite hastanesinin kan alma biriminde gerçekleştirildi. Toplam doksan dokuz hasta, üç gruba randomize edildi. Görsel grupta yer alan hastalara ekranda bulunan doğa fotoğrafına, işitme grubunda yer alan hastalara ise dinledikleri doğa seslerine odaklanmaları istendi. Veriler; Kişisel Bilgi Formu ve Görsel Ağrı Ölçeği kullanılarak toplandı. Verilerin analizinde; tanımlayıcı istatistiksel yöntemler, Kruskal-Wallis, Pearson Chi-Square ve Monte Carlo Exact Testi kullanıldı. Anlamlılık, $p<0.05$ ve $p<0.001$ düzeyinde değerlendirildi.

Bulgular
Görsel ve işitsel grup arasında istatistiksel olarak anlamlı bir farka rastlanmadı ($p>0.05$). Ancak bu iki grupta yer alan hastaların ağrı düzeyleri, kontrol grubunda yer alan hastalara göre daha düşük bulundu ($p<0.001$).

Sonuç
Bu araştırma yetişkinlerde bilişsel yönetiminin akut ağrı düzeyi üzerindeki olumlu etkisini ortaya koymaktadır. Bilişsel yönetim kapsamında kullanılan görsel ve işitsel yöntemlerin güvenle kullanılabileceğini kanıtlamakta ve kanıta dayalı bilgiler sunmaktadır.

Anahtar Kelimeler: Ağrı yönetimi, Hemşirelik, Kan alma

Abstract

Objective
This study aims to determine the pain experienced by adult patients during the bloodletting procedure and to reveal the effect of visual and auditory methods on the level of pain compared to routine bloodletting procedures.

Material and Method
The study was conducted as a randomized controlled trial. The study was carried out in a blood collection unit of a hospital on 15.01.2022. A total of ninety-nine patients were randomized into three groups (visual,

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Müracaat tarihi/Application Date: 05.10.2023 • Kabul tarihi/Accepted Date: 29.10.2023
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auditory, and control groups). Visual Group patients were asked to focus on the nature photograph on the screen, and the Auditory Group patients were asked to focus on the nature sounds they listened to. Data were collected using the Personal Information Form and the Visual Analog Scale (VAS). In the analysis of the data, descriptive statistical methods, Kruskal-Wallis, Pearson Chi-Square, and Monte Carlo Exact Tests were used. The significance level was taken as $p<0.05$ and $p<0.001$.

Results
No statistically significant difference was found between the visual and auditory groups ($p>0.05$). However, the pain levels of the patients in the visual and auditory groups were found lower than the pain levels of the patients in the control group ($p<0.001$).

Conclusion
This study reveals the positive effect of distraction on the level of acute pain in adults. The study proves that visual and audial methods can be used safely within the scope of distraction methods and presents evidence-based information.

Keywords: Bloodletting, Nursing, Pain management

Introduction

Needle pain is a common and primary problem in health care centers (1, 2). Needle pain, which is frequently encountered especially in children, can also be seen at a high rate in adults (3). The rate of the adult population admitting that they are afraid of needles due to pain is 50.8% (4). It has also been stated that they want to get away from medical environments due to this fear of needles and they experience distress (1). Blood tests, which are frequently requested in general examinations, require patients to tolerate needles (5). However, previous negative experiences with pain; delay and prevent benefiting from health services (1, 2).

Experiences may cause fear of needles. The concept of experience mentioned here mostly represents pain (2, 6). It is known that the level of fear of patients who do not have effective pain management in routine bloodletting practice increases (6, 7). This situation can become permanent as increased fear of needles and pain (6). To prevent this situation from becoming permanent, effective coping strategies with needle pain should be developed (7, 8).

Distraction methods seems to have a positive effect on patients' pain levels (7, 8). Among these methods, visual and auditory methods allow consciousness to focus on one stimulus at a time. In this way, it reduces the sensation of pain experienced by the individual by disconnecting the senses from the nociceptive stimuli (9). In addition, visual and auditory methods can reduce the sensation of pain by allowing the individual to focus on an area other than the current environment (1, 2). Another effect of visual and auditory methods are changes in hormone levels through neuroendocrinological pathways. These methods can reduce pain levels by affecting the expression of opiate, nitric oxide, cytokine and hormone levels through neuroendocrinological pathways (10). The use of the visual and auditory methods allows individuals to cope more easily with the pain sensations they have previously experienced and feel less fear. In this way, the synergistic effect of fear on pain sensation can be reduced, and it can also have positive reflections on the next blood collection experience that the individual may experience (6, 7). There are limited experimental studies in Turkey that reveal the level of pain experienced by adult patients during the bloodletting process and their coping strategies. However, both healthcare professionals and patients need to manage the pain experienced in a practice that we encounter frequently, such as bloodletting.

This study aims to determine the pain experienced by adult patients during the bloodletting procedure and to reveal the effect of visual and auditory methods on the level of pain compared to routine bloodletting procedures. It is considered that the study results can guide both patients and healthcare professionals.

Material and Method

Study Design
The study was conducted as a randomized controlled trial on 15.01.2022. The suitability of the blood collection unit, the researchers who will perform the procedure, and the suitability of the nurses were effective in the selection of the relevant date.

Study Sample
The population of the study consisted of 475 patients

who visited the blood collection unit of a hospital for diagnosis on 15.01.2022. A total of 137 patients who did not meet the inclusion criteria and 18 patients who declined to participate in the study were excluded from the study. The sample size was determined using G-Power 3.1.9.2 software. The effect size value required in the G-Power analysis was calculated with a pilot study conducted one week before the date of the study. Patients were randomized into three groups (control group, visual group, and auditory group) for this pilot study. Each group consisted of five patients. According to the results of the pilot study, the effect size values were calculated as 0.912. “F test” was chosen as the test family, and “ANOVA: Fixed effects, omnibus, one-way” was chosen as the statistical analysis. The sample size of the study was found to be a minimum of 24 patients for each group (95% confidence interval, 5% error rate, and d=0.912). However, considering the possibility of data loss, it was decided to evaluate 33 patients in each group. The study was completed with a total of 99 patients (n=99) (Figure 1).

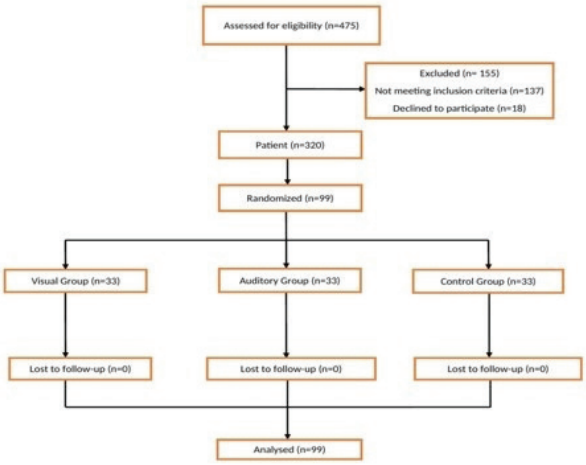

Figure 1
Consort participant flow diagram

Inclusion and Exclusion Criteria
Adult volunteer patients who could communicate with us (speak Turkish, express themselves), literate (because the questions should be read and answered), who visit the outpatient blood collection unit for diagnostic purposes, whose blood collection was performed in the first trial were included in the study.

- Cancer patients receiving chemotherapy,
- Patients receiving psychiatric treatment,
- Hemodialysis patients,
- Pregnant women,
- Patients with a recent history of transfusion and surgery (as it may affect the results of the study) were excluded from the study.

Randomization and Blinding
A randomization list was used to randomly distribute patients into groups. The patients were numbered according to the order of arrival (11). Patients were assigned to groups (visual, auditory, and control groups) according to the numbers in the randomization list. Due to the nature of the study, blinding could not be performed in selected patients. However, for the principal investigator to remain in the blinding order, the bloodletting procedure and the interventions were performed by three different nurses. The data obtained in line with these procedures were recorded by the second researcher. Thus, the principal investigator did not see the techniques applied to the patients and did not take part in the data collection phase.

Data Collection Tools
Personal information form and the visual analog scale (VAS) were used as data collection tools.

Personal Information Form: This form consists of a total of 12 questions regarding the characteristics (age, gender, weight, height, education status, occupation, having a chronic disease, if yes, which chronic disease, fear of needles, if yes, the reason for needle fear, hemophobia, having a bad experience with bloodletting) of adult patients.

Visual Analog Scale (VAS): The Visual Analog Scale (VAS) helps to determine the pain level of patients. The VAS is a 10 cm line with anchor statements on the left "No Pain" and on the right "Unbearable Pain". The patient is asked to mark the current pain level on this line. The pain felt is made visible by measuring the distance between the left end of the line and the marked part with a ruler.

Study Protocol
Patients in the control group were not informed about the research process before the intervention. Permission was obtained from the patients in the visual and auditory group for the visual or auditory intervention to be performed. Patients in these two groups were informed about the research after the intervention and asked whether they wanted to participate in the study or not. Any data loss did not occur in this process. The research process was planned in this way in order to prevent the Hawthorne effect that may be seen in the patients in the groups. According to Hawthorne theory, experiments can

change the results of researchs when subjects know that they are being observed. This can manifest itself in two ways. In positive Hawthorne (feeling valued, positive approach, etc.), patients may express the intensity of pain they feel with a lower value due to being observed, while in negative Hawthorne (negative dialog, knowing that they were observed only for research, etc.), the opposite can be seen (12).

For pain management, patients in the visual group were asked to focus on the nature photographs on the screen (adjusted to be at the patient's eye level), and routine bloodletting was performed. Disposable earplugs were used to prevent patients from being affected by external sounds. After the procedure, the patients were asked to mark their pain levels on the VAS (scoring from 0 to 10) and to fill out the questionnaire.

Patients in the auditory group were asked to focus on the sounds of nature they heard, and routine bloodletting was performed. Disposable eye patches were used to prevent the patients from being affected by the external environment. Disposable earplugs were used for each patient. After the procedure, the patients were asked to mark their pain levels on the VAS and to fill out the questionnaire.

Routine bloodletting was performed for the patients in the control group. After the procedure, the patients were asked to mark their pain levels on the VAS and to fill out the questionnaire.

The interventions were carried out in three different locations of the blood collection unit (in a way that prevents patients from seeing and hearing each other).

A different nurse was determined for each group (have 5 years experience in blood collection unit). These nurses performed the bloodletting and the interventions (vacutainer blood collection needles of the same size were used for each blood collection procedure). Data were collected by the second researcher (within the first 5 minutes after blood collection). All other procedures were performed by the principal investigator.

Data Analysis

The data obtained from the study were computerized and analyzed with IBM SPSS 21.0 software. Descriptive statistical methods (mean, standard deviation, frequency) as well as Kruskal-Wallis, Pearson Chi-Square and Monte Carlo Exact Tests were used to analyze the data. The conformity of quantitative data to normal distribution was evaluated by Shapiro-Wilk and Kolmogorov Smirnov. Kruskal-Wallis tests were used to compare data that did not conform to normal distribution. Pearson Chi-Square and Monte Carlo Exact Tests were used to analyze the significance between qualitive data. Significance level was taken as $p<0.05$ and $p<0.001$.

Results

Table 1 shows the descriptive characteristics of the patients included in the study groups. The descriptive characteristics of the patients were compared according to the groups. It was determined that the groups were similar in terms of age, gender, body mass index (BMI), education status, occupation, having a chronic disease, if yes, which chronic disease, fear of needles, if yes, the reason for fear of needles, hemophobia, and having a bad experience with bloodletting, and the groups were homogeneously distributed ($p>0.05$) (Table 1).

It was determined that 72.7% of the control group, 75.8% of the visual group, and 54.5% of the auditory group experienced needle fear. Also, the control, visual and auditory groups expressed the situation that causes fear of needles as “Feeling Pain” at a rate of 45.4%, 51.6%, and 39.3%, respectively. While it was determined that more than half of the control group patients (54.5%) and visual group patients (57.6%) did not have hemophobia, this rate was found to be higher in the auditory group (72.7%). In addition, it was determined that more than half of the patients in the three groups did not have a bad experience with bloodletting (Table 1). It was determined that there was no significant relationship between the descriptive characteristics of the patients and their pain levels ($p>0.05$). When the pain levels of the patients were compared according to the groups, the rates were 6.70 (1.2-10) for the control group, 2 (0.6-4.6) for the visual group, and 1.3 (0.2-4.3) for the auditory group. While no statistically significant difference was found between the visual and auditory groups ($p>0.05$), there was a statistically significant difference between the control group and these two groups ($p<0.001$). In other words, the level of pain perceived by individuals differs highly according to distraction methods ($\eta 2$:0.573). When the results were interpreted, it was determined that the control group patients had higher pain levels than the visual group patients and auditory group patients. Also, although there was no significant difference between the visual and auditory groups, it was determined that the visual group patients had a higher level of pain than the auditory group patients (Table 2).

Table 1 Descriptive characteristics of the patients

		Control group		Visual group		Auditory group		Test statistics	p
		n	%	n	%	n	%		
Age (Mean±Sd)		49.91±15.81		54.58±15.20		58.06±14.37		5.189*	0.075
Gender	Female	21	63.6	19	57.6	21	63.6	0.342**	0.843
	Male	12	36.4	14	42.4	12	36.4		
Body mass index (BMI)		27.74±6.84		29.52±8.49		29.09±7.41		0.882*	0.643
Education status	No literacy	1	3	0	0	1	3	6.670***	0.352
	Primary education	12	36.4	18	54.6	17	51.5		
	High school	6	18.2	7	21.2	9	27.3		
	University	14	42.4	8	24.2	6	18.2		
Occupation	Housewife	11	33.3	14	42.4	21	63.6	11.355***	0.073
	Retired	5	15.2	6	18.2	6	18.2		
	Civil servant	9	27.3	4	12.1	1	3		
	Other (farmer, pharmacist, teacher, student, private sector)	8	24.2	9	27.3	5	15.2		
Having a chronic disease	Yes	19	57.6	20	60.6	25	75.8	2.740**	0.524
	No	14	42.4	13	39.4	8	24.2		
If yes, which chronic disease	Diabetes mellitus	7	21.2	9	27.3	9	27.3	2.657***	0.650
	Hypertension	8	24.2	5	18.2	7	21.2		
	Heart failure	4	12.2	5	15.2	9	27.3		
Fear of needles	Yes	24	72.7	25	75.8	18	54.5	3.971**	0.137
	No	9	27.3	8	24.2	15	45.5		
If yes, the reason for fear of needles	Feeling pain	15	45.4	17	51.6	13	39.3	0.453**	0.797
	Failure to find vein	9	27.3	8	24.2	5	15.2		
Hemophobia	Yes	15	45.5	14	42.4	9	27.3	2.648**	0.266
	No	18	54.5	19	57.6	24	72.7		
Having a bad experience with bloodletting	Yes	13	39.4	10	30.3	13	39.4	0.786**	0.675
	No	20	60.6	23	69.7	20	60.6		

*Kruskal-Wallis Test, ** Pearson Chi-Square, *** Monte Carlo Exact Test.

Table 2 Comparison of pain level by groups

	Control group	Visual group	Auditory group	Test statistics	p
Pain level	6.70 (1.2-10) a	2 (0.6-4.6) bc	1.3 (0.2-4.3) bc	44.847*	**<0.001*** **0.573****

*Kruskal-Wallis Test, **Eta-squared (η2) Test, a-b: There is no difference between groups with the same letter.

Discussion

Bloodletting is one of the invasive procedures commonly used for diagnostic purposes. Such applications reveal the feeling of pain due to the density of nerve endings in the epidermis and psychological factors (13, 14). The majority of the adult population states that they experience fear due to the pain caused by the needle. Moreover, this fear prevents patients from benefiting from health services (1, 2, 4). The relevant literature states that distraction methods are effective on pain level (7, 9-15). For this purpose, this study aims to detect the pain experienced by adult patients during the bloodletting procedure and to reveal the effect of distraction methods on the level of pain compared to routine bloodletting.

Pain is a significant condition that can be seen in all age groups (16-19). Some studies indicate that needle pain decreases with age (18, 20). On the other hand, other studies reported that the young population is more afraid of bloodletting, and this condition increases the level of pain experienced (12, 18). Elderly patients can consider pain as a natural part of their developmental period. Also, at these ages, a sensory loss can reduce the feeling of pain (19-21). Young people, on the other hand, may experience more pain due to their emotional distress (12, 18). In this study, it was determined that there was no significant difference in the pain levels of the patients according to their age ($p>0.05$). It is considered that this may be due to the fact that the patients included in the current study were adulthood.

The relationship between gender and pain is among the subjects that are still being studied. Bimpong et al. (2021) reported that females experience more pain than males (21). Lloyd et al. (2020) on the other hand, state that females are more sensitive to pain (22). In the same study, it was reported that various factors may cause this sensitivity and that a high progesterone level may increase pain sensitivity. Bartley et al. (2015) stated that the testosterone hormone reduces the level of pain (23). It has been stated that pain intensity decreases with increasing testosterone levels in females (21, 22, 24). Previous studies reveal that females experience more pain than males. However, it is also stated that males may experience more pain than females. Society's portrayal of females in a more fragile structure enables the pain experienced to be expressed more. This situation also shows that females can express their pain more easily. Males, who are portrayed as strong by society, cannot express their pain levels as they wish (21, 23). In this study, it was determined that there was no significant difference in the pain levels of the patients according to their gender ($p>0.05$). When the relevant literature is examined, it can be stated that this is an expected result.

Patients with obesity (BMI≥30) experience more pain than other patients (25, 26). Fats are tissues that have an endocrine function to produce cytokines. Normal weight patients have M2 macrophage cells in their adipose tissue. These cells secrete anti-inflammatory cytokines (For example IL-10). However, when excess fat is stored in the body, M1 macrophages pass into the adipose tissue and secrete proinflammatory cytokines (For example TNF-α, IL-1, IL-6). Cytokines secreted in patients with high BMI cause pain by creating low-grade inflammation through the blood circulation. These cytokines also affect both the peripheral and central nervous systems, making patients more sensitive to mechanical stimuli. These results provide evidence that patients with higher BMI experience more needle pain (25, 26). Chin et al. (2020) stated that patients with obesity have lower pain tolerance (25). In the present study, it was determined that there was no significant difference in the pain levels of the patients according to their BMI ($p>0.05$). Considering that the BMI of the patients participating in the study was below 30, it can be stated that the result of the study is compatible with the literature.

In the present study, it was determined that there was no significant relationship between education status and pain level ($p>0.05$). Studies are generally carried out on chronic patients. There are not enough studies that can reveal the relationship between pain experienced in acute processes and educational status. It is considered that this situation is due to the lack of sufficient time to evaluate the effectiveness of the education status of the patients in procedures performed in a short time, such as bloodletting.

Fear of needles may differ according to occupations. McLenon and Rogers (2019) (17) reported that 27% of hospital staff and 16% of adult patients experienced fear of needles (17). When the results are interpreted, it is noticed that hospital staff experience more fear of needles than other adult patients. It is thought that this situation may be due to the effects of the reactions of the patients due to needle pain on the hospital staff. However, in this study, it was found that the pain level of the patients did not differ significantly according to their occupation ($p>0.05$). The lack of sufficient studies on the subject causes limitations in interpreting our study results.

Patients with chronic diseases are more frequently exposed to procedures with needles. This causes patients to experience more fear of needles (27).

McLenon and Rogers (2019) stated that most patients diagnosed with chronic diseases are afraid of procedures with needles, but this fear gradually decreases in the ongoing processes (17). Duncanson et al. (2021), on the other hand, state that patients should be supported in repetitive procedures with needles (27). Cimpean and David (2019) report that pain experiences that are not properly managed can cause fear (28). These results emphasize the importance of controlling pain experiences with necessary methods in patients with chronic diseases. The results of the present study show that there is no significant difference between the patients' chronic disease status and their pain levels ($p>0.05$). This result may be an indication that the patients participating in the study had positive pain experiences.

Pain during the bloodletting can cause patients to experience fear. This fear can also increase the pain sensitivity of patients (28-30). Markfelder and Pauli (2020) stated that fear of pain is associated with increased pain levels (29). In the current study, it was determined that there was no significant relationship between the fear of needles/cause and pain levels of the patients ($p>0.05$). However, when the data were examined, it was observed that the patients participating in the study were afraid of needles. Participants stated that they were afraid of feeling pain as the reason for this situation. Although our study results are not significant, when the data are interpreted, it is considered that our results are compatible with the literature.

In our study, it was determined that there was no significant relationship between having a bad experience with bloodletting and the level of pain ($p>0.05$). The study of Cimpean and David (2019) supports that negative pain experiences and fear of pain can be prevented when bloodletting is successfully managed (28). This study is an indication that our results are compatible with the literature. The study by Wani et al. (2014) found that approximately 4% of the general population has hemophobia (31). For this reason, it is stated that patients may avoid bloodletting. In our study, it was observed that there was no significant relationship between the patients' hemophobia and their pain levels ($p>0.05$). Considering the low prevalence of hemophobia in the literature, it is considered that our study result is compatible with the literature.

Numerous studies indicate that distraction methods can reduce the level of pain (13, 14). The results of these studies generally support two main views. The first view claims that the mind can only focus on one stimulus at a time. The second view argues that with these methods, the senses are disconnected from nociceptive stimuli (13). Regardless of the result, success can be achieved in pain management by using distraction methods. However, the selected methods must be interesting and effective (13). According to our study results, there was no statistically significant difference in pain levels between the visual and auditory groups ($p>0.05$), but there was a statistically significant difference between these two groups and the control group ($p<0.001$). It was determined that the patients in the control group had higher pain levels than the patients in the visual and auditory groups. Also, although there was no significant difference between the visual and auditory groups, it was observed that the patients in the visual group had a higher level of pain than the patients in the auditory group. Akın (2021) reports that auditory methods affect hormone levels through neuro endocrinological pathways, thus reducing pain levels (10). Czech et al. (2021) state that engaging visual methods reduce the level of pain (9). When the literature is examined, it is considered that our study results are compatible with recent studies.

Conclusion

In our study, it was observed that the patients with distraction methods during the bloodletting procedure experienced a less of pain than the other patients. Also, it was determined that the use of visual techniques as a distraction method gave more positive results on the level of pain than auditory techniques. It is considered that it is essential to bring evidence-based information to the literature by conducting more experimental studies on adult patients on the subject.

Limitations

This study was a randomized controlled trial. There wasn't matching according to sociodemographic characteristics in the study design. In addition, three different nurses (one nurse for each group) were employed because blood procedure was started at the same time for each group.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Ethical Approval

The research protocol was approved by the clinical research ethics committee of a medical school (Suleyman Demirel University Faculty of Medicine Clinical Research Ethics Committee, 30.12.2020, 72867572-050.01.04-). Permission was obtained from the institution where the study was conducted to

collect the study data (Suleyman Demirel University Research and Application Hospital, 26.02.2021, E-26515734-605.01-31294). The Declaration of Helsinki was complied with at every step of the study.

Consent to Participate and Publish
All patients were informed about the purpose of the study. Informed consent was obtained from the patients to publish and participate.

Funding
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Availability of Data and Materials
Data available on request from the authors.

Authors Contributions
TÇ: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Visualization; Writing-original draft; Writing-review & editing.

FEA: Conceptualization; Investigation; Methodology; Validation; Visualization; Writing-review & editing.

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