



ORIGINAL ARTICLE

Determination of Comfort and Anxiety Levels of Patients Undergoing Coronary Angiography

Koroner Anjiyografi Uygulanan Hastaların Konfor ve Anksiyete Düzeylerinin Belirlenmesi

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Abstract

Introduction: In most cases, the decision to undergo angiography is a stressful experience for patients. During the immobilized period, anxiety and comfort levels must be determined, and the influencing factors must be understood. **Methods:** The sample of the study involved 150 people over 18 years of age, who underwent coronary angiography in a university hospital, had no communication problems, were in the immobile period after coronary angiography, and volunteered to participate in the study. Personal Information Form, State Anxiety Scale, Trait Anxiety Scale, and Immobilization Comfort Scale were used as data collection tools. Using SPSS 22 software, the data used in the study were analyzed.

Results: The results revealed mean scores for state anxiety, trait anxiety, and comfort, which were $42.820 \pm 8,113$, $36.053 \pm 5,871$, and $73.533 \pm 11,451$, respectively. In conclusion, there was a weak negative relationship between comfort and state anxiety. State and trait anxiety explained 53.6% of the total change in comfort level, with state anxiety decreasing comfort, whereas trait anxiety had no significant impact.

Discussion and Conclusion: The findings showed that the state anxiety of patients was linked to a decrease in the comfort level, whereas trait anxiety did not significantly affect the comfort level. Nurses should be aware of the existing anxiety in patients who undergo coronary angiography and must plan interventions accordingly.

Keywords: Anxiety; Comfort; Coronary Angiography; Nursing

On a global scale, coronary artery disease (CAD) is a health concern and the leading cause of death, which contributes to approximately 17.9 million deaths annually.

^[1] Even though coronary angiography (CA) is the most

commonly employed method in the diagnosis and treatment of CAD, it can cause serious complications including stroke, myocardial infarction, arrhythmia, embolism, and bleeding.

^[2,3] Hence, patients are oftentimes stressed out when

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deciding whether to undergo angiography or not.^[4] Patients not knowing what to expect during the angiography procedure, having to lie in the supine position for a certain period of time following the procedure, not meeting their own needs, and having persistent back and chest pain, nausea, and so forth can lead to increased anxiety and deviate from the comfort zone.^[5]

As an invasive procedure, CA on a vital organ including the heart may induce anxiety in patients.^[6] Studies show that patients, particularly those undergoing CA for the first time, often experience moderate anxiety, fear, and uncertainty.^[7] Recognizing these concerns, nurses must assess and manage individual anxiety levels.^[8,9] Even in cases with normal results, patients may still experience anxiety, which is often rooted in a lack of understanding of the procedure.^[10] Educational interventions have been shown to decrease anxiety, shorten treatment time, and enhance patient satisfaction, which emphasizes the importance of patient education in anxiety management.^[11]

The relaxation dimension is the foundation for the concept of comfort, which is a crucial nursing goal. Lack of comfort can cause patients to become restless and anxious, impairing their capacity to adapt to illness and altering the disease's course and response to treatment, lowering the quality of life.^[12] Invasive interventions, which cause emotional, physical, and cognitive changes, have a significant impact on patient comfort.^[1,13,14] Prolonged immobilization during CA worsens comfort, frequently leading to a negative perception of health. Recognizing the comprehensive impact, comfort must be assessed in all dimensions, rather than focusing solely on pain, so as to maintain holistic patient well-being.^[15]

A study found that patients' anxiety levels decreased as comfort increased during the immobile period, which highlights the significance of nurses who provide postprocedure information in this phase.^[16] Furthermore, enhancing hospital conditions and tailoring training to individual needs have been suggested to be effective strategies to reduce state duration anxiety levels and enhance patient comfort.^[17]

As numerous studies show, patients undergoing CA must be assessed not only for physical complaints but also for psychosocial factors. Psychiatric nurses play a key role in planning psychosocial care, which includes counseling those who are directly involved in patient care during CA. During the immobilized period, anxiety and comfort levels must be identified, the influencing factors must be understood. These levels must be recognized when planning interventions to minimize associated factors. In this study,

the comfort and anxiety levels of patients undergoing CA are determined, and their relationship is explored.

Materials and Methods

Type of Research

This research is descriptive and correlational in design.

Population and Sample

In this study, patients undergoing CA at a university hospital who met specific criteria were included: age over 18 years, no communication issues, ability to read and understand Turkish, currently in the immobile post-angiography period, and willingness to participate. Using sample size calculation via G*Power 3.1, with an effect size of 0.157 from a relevant literature study, it was determined that 102 participants for a study power exceeding 95% (df=99; F=3.088) at a 5% significance level were required. To ensure a robust test, the study aimed to enroll 150 participants. After obtaining the necessary permissions, data were collected via face-to-face interviews.

Data Collection Tools

Using the Personal Information Form, State-Trait Anxiety Scale, and Immobilisation Comfort Scale, the research data were collected, in order to determine the patients' descriptive characteristics.

Personal Information Form

This form comprises 20 questions that are related to patients' gender, educational status, age, marital status, smoking habits, presence of chronic diseases, and previous experiences with angiography.^[8,13]

State-Trait Anxiety Scale

The validity and reliability analysis of the scale developed by Spielberger et al. was carried out by Öner and Le Compte in 1998.^[18,19] The scale comprises a total of 40 questions and evaluates state (20 items) and trait (20 items) anxiety levels. The State Anxiety Scale (SAS) assesses a person's anxiety in a specific situation, whereas the Trait Anxiety Scale (TAS) assesses the person's general anxiety. Scores obtained from the scale range from 20 (indicating low anxiety) to 80 (indicating high anxiety). A high score indicates increased anxiety. The Cronbach's alpha internal consistency coefficient for the validity and reliability study of the scale is between 0.83 and 0.87 for the The State Anxiety Scale (SAS) and between 0.94 and 0.96 for Trait Anxiety Scale (TAS) In this study, Cronbach's alpha values were found to be 0.85 for the state anxiety scale and 0.84 for the trait anxiety scale.

Table 1. Mean Scores of the SAS, TAS, and ICS scores of patients undergoing coronary angiography (n=150)

	n	M	SD	Min	Max	Alpha
State anxiety	150	42.82	8.11	24.00	72.00	0.82
Trait anxiety	150	36.05	5.87	24.00	54.00	0.84
Immobilization comfort	150	73.53	11.45	44.00	104.00	0.84

SAS: State Anxiety Scale; TAS: Trait Anxiety Scale; ICS: Immobilization Comfort Scale; n: Number; M: Mean; SD: Standard deviation; Min: Minimum; Max: Maximum.

Immobilisation Comfort Scale

The validity and reliability study of the scale developed by Hogan–Miller in 1995 was carried out by Tosun et al.^[20,21] The scale comprises 20 items. The scale statements are in a six-point Likert style, ranging from “strongly disagree” to “strongly agree.” Items 2, 3, 4, 4, 7, 8, 10, 13, 14, and 18 in the Immobilization Comfort Scale (ICS) are negative statements. The total scores obtained from the scale vary between 20 and 120, with a high score indicating good comfort. The Cronbach's alpha value of the scale was 0.82 in Tosun et al.'s (2015) study and 0.84 in this study.

Ethical Consideration

Data were collected after obtaining approval from the Lokman Hekim Health Sciences Scientific Research Ethics Committee (Approval Number: 2023/32, Date: 13.03.2023) and acquiring necessary institutional permissions. The patients were interviewed, and individual consent was obtained after explaining the purpose and method of the study, along with providing information on the forms and scales to be applied. The researcher gathered the data collection forms via individual interviews with patients during their immobility. The application of data collection tools took approximately 15–20 min. The study was conducted according to the principles outlined in the Declaration of Helsinki.

Data Analysis

The study data were analyzed using SPSS 22.0 software (IBM Statistical Package for the Social Sciences, Armonk, NY, USA). Descriptive statistics (number, frequency, percentage, mean, and standard deviation) were employed to evaluate the data. Normal distribution was assessed using kurtosis and skewness values. Variable relationships were examined using correlational analyses. Two independent variables were compared using the t-test, whereas differences among multiple groups were analyzed using analysis of variance. Relationships between variables were explored using Pearson correlation analysis, and reasons for observed differences were investigated using *post-hoc* analyses.

Results

Of the patients, 33.3% were between 61 and 70 years old, 41.3% were overweight, 71.3% were male, 46% were primary school graduates, 84.7% were married, and 55.3% were retired. Moreover, 62.7% of the patients were non-smokers, 70% had a chronic disease, and 75.2% of those with chronic diseases had hypertension.

It was determined that 57.3% of the patients had previously undergone angiography, and 49.3% of them had a family member who had undergone angiography. Furthermore, 74% of the patients who undergoing CA had previous hospitalization experience, 82% interpreted their health status as good during the immobile period, 66% had prior knowledge of angiography, and 92% had urgent angiography planning, and the result of the procedure performed after angiography was the decision for a surgical procedure, with 29.3%.

The mean state anxiety score was 42.820 ± 8.113 (min=24; max=72), the mean trait anxiety score was 36.053 ± 5.871 (min=24; max=54), and the mean comfort score was 73.533 ± 11.451 (min=44; max=104) (Table 1).

Table 2 displays the mean scores of patients undergoing CA based on descriptive characteristics. Notably, state anxiety scores showed a statistically significant difference by age ($F=3.155$; $p=0.027 < 0.05$; $\eta^2=0.061$). *Post-hoc* analysis showed higher state anxiety scores in patients aged 51–60 years, in comparison with those aged 61–70 years ($p < 0.05$). Gender-based analysis revealed higher trait anxiety scores in female patients ($\bar{x}=38.302$) than in male ones ($\bar{x}=35.150$), which indicates a statistically significant difference. Moreover, educational status influenced trait anxiety scores significantly ($F=2.677$; $p=0.034 < 0.05$; $\eta^2=0.069$), with literate patients scoring higher than high school and university graduates in *post-hoc* analysis.

Married patients presented lower trait anxiety scores ($\bar{x}=35.551$) when compared to single patients ($\bar{x}=38.826$) ($t=-2.505$; $p=0.013 < 0.05$; $d=0.568$; $\eta^2=0.041$). Comfort total scores were higher in married patients ($\bar{x}=74.685$) than in single patients ($\bar{x}=67.174$) ($t=2.970$; $p=0.003 < 0.05$; $d=0.673$; $\eta^2=0.056$). Marital status significantly influenced

Table 2. Distribution of the mean scores of the SAS, TAS, and ICS in patients undergoing coronary angiography according to descriptive characteristics (n=150)

Descriptive characteristics	n	State anxiety Mean±SD	Trait anxiety Mean±SD	Immobilization comfort Mean±SD
Age				
50 and below	19	41.68±7.46	35.10±6.43	75.05±10.85
51–60	38	46.00±10.20	36.57±6.09	71.92±11.07
61–70	50	40.88±4.570	34.56±5.71	75.02±9.31
71 and above	43	42.76±8.906	37.74±5.23	72.55±14.08
F		3.155	2.616	0.744
p		0.027	0.053	0.528
Post-hoc		2>3 (p<0.05)		
Gender				
Female	43	41.86±7.24	38.30±6.42	73.48±11.57
Male	107	43.20±8.43	35.15±5.40	73.55±11.45
t		-0.918	3.056	-0.030
p		0.360	0.003	0.976
Education status				
Literate	20	40.65±9.13	39.20±6.17	73.80±14.20
Primary school	69	43.23±6.82	36.42±5.65	71.84±9.92
Middle school	20	44.75±8.92	34.60±5.33	73.10±11.61
High school	26	43.15±10.21	35.11±6.18	77.42±12.92
University	15	40.66±6.98	33.73±5.27	74.80±10.83
F		0.959	2.677	1.189
p		0.432	0.034	0.318
Post-hoc		1>3, 1>4, 1>5 (p<0.05)		
Marital status				
Married	127	42.31±7.93	35.55±5.65	74.68±11.04
Single	23	45.60±8.71	38.82±6.38	67.17±11.83
t		-1.805	-2.505	2.970
p		0.073	0.013	0.003
Employment status				
Working	28	42.07±9.71	33.96±6.09	75.39±11.92
Not working	39	41.46±7.19	38.10±6.56	73.15±11.90
Retired	83	43.71±7.91	35.79±5.18	73.08±11.15
F		1.169	4.423	0.451
p		0.314	0.014	0.638
Post-hoc		2>1, 2>3 (p<0.05)		
Interpretation of health in the immobile period				
Poor	27	49.74±8.78	37.81±5.60	63.70±11.55
Good	123	41.30±7.14	35.66±5.87	75.69±10.27
t		5.325	1.733	-5.365
p		0.000	0.085	0.000
Prior knowledge of angiography				
Yes	99	42.88±7.82	36.81±5.71	72.81±11.79
No	51	42.68±8.71	34.56±5.94	74.92±10.73

Table 2 (cont). Distribution of the mean scores of the SAS, TAS, and ICS in patients undergoing coronary angiography according to descriptive characteristics (n=150)

Descriptive characteristics	n	State anxiety Mean±SD	Trait anxiety Mean±SD	Immobilization comfort Mean±SD
Prior knowledge of angiography				
t		0.144	2.253	-1.066
p		0.885	0.026	0.288
How angiography planning				
Emergency	138	42.77±7.36	35.71±5.76	73.47±10.73
Elective	12	43.33±14.71	40.00±5.89	74.16±18.45
t		-0.228	-2.469	-0.199
p		0.899	0.015	0.901

trait anxiety and comfort total scores ($p < 0.05$). Trait anxiety scores in the study varied significantly by employment status ($F=4.423$; $p=0.014 < 0.05$; $\eta^2=0.057$). *Post-hoc* analysis showed higher trait anxiety scores in non-working patients than in working patients ($p < 0.05$). Furthermore, trait anxiety scores in non-working patients were higher than those in retired patients ($p < 0.05$).

Patients interpreting their health as poor during the immobile period had higher state anxiety scores ($\bar{x}=49.741$) compared to those interpreting their health as good ($\bar{x}=41.301$) ($t=5.325$; $p=0 < 0.05$; $d=1.132$; $\eta^2=0.161$). Likewise, comfort total scores were lower in patients interpreting their health as poor ($\bar{x}=63.704$) than in those interpreting their health as good ($\bar{x}=75.691$) ($t=-5.365$; $p=0 < 0.05$; $d=1.140$; $\eta^2=0.163$). Significant differences were found between the interpretation of health during the immobile period and state anxiety as well as comfort scores.

The trait anxiety scores differed in terms of prior knowledge about angiography, with higher scores in patients informed regarding the procedure ($\bar{x}=36.818$) than in those without prior knowledge ($\bar{x}=34.569$) ($t=2.253$; $p=0.026 < 0.05$; $d=0.388$; $\eta^2=0.033$). Nevertheless, state anxiety and comfort total scores did not significantly differ in terms of prior knowledge ($p > 0.05$). Likewise, trait anxiety scores were significantly lower in patients with emergency procedure planning ($\bar{x}=35.710$) than in elective patients ($\bar{x}=40.000$) ($t=-2.469$; $p=0.015 < 0.05$; $d=0.743$; $\eta^2=0.040$). Yet, state anxiety and comfort total scores did not exhibit a significant difference in terms of angiography planning ($p > 0.05$).

State anxiety, trait anxiety, and comfort total scores of the patients did not present a statistically significant difference in terms of smoking status, the presence of chronic disease, previous angiography, the presence of an angiography patient in the family, or previous hospitalization status ($p > 0.05$).

Table 3. Correlation analysis between anxiety and comfort scores of patients undergoing coronary angiography (n=150)

Scale	State anxiety	Trait anxiety	Immobilization comfort
State anxiety			
r	1.000		
p	0.000		
Trait anxiety			
r	0.357*	1.000	
p		0.000	0.000
Immobilization comfort			
r	-0.735*	-0.313*	1.000
p	0.000	0.000	0.000

*: < 0.05 ; Pearson correlation analysis.

Table 3 displays the correlation analyses between the state anxiety, trait anxiety, and comfort scores of patients undergoing CA. A negative correlation of $r=-0.735$ ($p=0.000 < 0.05$) was found between comfort and state anxiety, and a negative correlation of $r=-0.313$ ($p=0.000 < 0.05$) was found between comfort and trait anxiety.

Table 4 shows a regression analysis that assesses the impact of state and trait anxiety on total comfort in patients undergoing CA. The analysis revealed a significant cause-and-effect relationship ($F=87.171$; $p=0.000 < 0.05$), which explains 53.6% of the total change in comfort level ($R^2=0.536$). State anxiety negatively influences comfort level ($\beta=-0.714$), whereas trait anxiety does not significantly affect comfort level ($p=0.332 > 0.05$).

Discussion

In this study, the mean "state anxiety" score was 42.820 ± 8.113 , and the mean "trait anxiety" score was 36.053 ± 5.871 in patients who were undergoing CA. These findings show

Table 4. The effect of state anxiety and trait anxiety scores on comfort level of patients undergoing coronary angiography (n=150)

Independent variable	Unstandardized coefficients		Standardized coefficients	t	p	95% Confidence interval	
	B	SD	β			Min	Max
Constant	120.75	4.500		26.838	0.000	111.866	129.651
State anxiety	-1.007	0.084	-0.714	-11.953	0.000	-1.174	-0.841
Trait anxiety	-0.113	0.116	-0.058	-0.973	0.332	-0.343	0.117

Dependent variable=Comfort Total. R=0.737; R²=0.536; F=87.171; p=0.000; Durbin-Watson value=2.071.

that as per evaluation, the state anxiety and trait anxiety scores of the patients were at a moderate level. Türker and Bedük revealed that the mean score of the patients who were undergoing CA was 50.59±7.76 on the state anxiety scale and 39.61±9.41 on the trait anxiety scale.^[9] In another study conducted by Büyükünäl Şahin and Rızalar^[13] the mean state anxiety score of the patients who undergoing CA was 47.75±8.07, and the mean trait anxiety score was 48.77±6.07. In this study, the anxiety findings of the patients were found to be at a lower level when compared with the studies mentioned. This finding indicates that there may be differences in the anxiety levels of patients undergoing CA. This difference may be due to differences in patient populations, given that anxiety is a complicated condition that may be affected by individual differences.

In this study, the mean comfort scale score of the patients was 73.533±11.451. When the highest score that can be obtained from the scale is evaluated to be 120, the comfort level of the patients is considered to be above average. This finding is important because it may significantly affect the satisfaction of the patients who are undergoing CA and is important in terms of the subjective comfort experiences of the patients who are undergoing CA. The above-average comfort level indicated by the mean score indicates that most patients perceived the angiography procedure as relatively tolerable. This finding is consistent with our other finding that patients who perceived their health as good during the immobile period had high mean comfort scores. Taylor-Piliae and Chan emphasized the importance of early ambulation and decreasing the time spent in the supine position after CA in terms of minimizing the risk of bleeding at the femoral catheter insertion site.^[22] Moreover, Yildirim et al. investigated the factors that affect patients' comfort during diagnostic procedures and emphasized the psychological aspect of patient comfort, revealing that patients' anxiety levels may affect their comfort during the procedure.^[23]

In this study, the state anxiety scores of the patients exhibited a statistically significant difference in terms of age, and the state anxiety scores of patients aged between 51

and 60 years were found to be the highest. There are varying results in the literature in terms of the relationship between age and state anxiety. Türker and Bedük^[9] found that the SAS scores of patients aged 65 years and over were higher than those of the other age groups, whereas the patients with the lowest scores were in the 45–64 age group. By contrast, Şavk, Kebapçı, and Özcan reported that the anxiety scores of patients aged 18–25 years were the highest, whereas the anxiety scores were the lowest in the group over 65 years.^[24] Thus, these different results may be due to the varying classification of patient age ranges in the studies.

In this study, the trait anxiety scores of female patients were higher than those of male patients, and the trait anxiety scores of the patients presented a statistically significant difference in terms of gender. In parallel with our finding, in the literature, women undergoing CA experience more anxiety than men.^[8,25] This high level may be due to reasons including women's biological characteristics and their ability to share their feelings more easily and feeling pressure in terms of roles and expectations.

Trait anxiety scores of the patients exhibited a statistically significant difference in terms of educational status. The mean trait anxiety score of literate patients was the highest, whereas university graduates had the lowest mean trait anxiety score. As hypothesized, patients' awareness increases as education levels increase, leading them to seek more information regarding their situation and develop effective coping strategies. Nevertheless, a study reported a decrease in anxiety as patients' education levels increased.^[26] In another study, the decrease in anxiety levels with higher education was interpreted as individuals with advanced education having better socioeconomic conditions and employing stress-coping techniques more effectively.^[8]

In this study, the trait anxiety scores of married patients were lower than those of single patients, and the comfort level of married patients was higher, with the difference being statistically significant. Furthermore, the state anxiety scores of the patients did not present a statistically

significant difference in terms of marital status. Being married may play an effective role in reducing anxiety in individuals' lives by increasing social ties and providing social and emotional support.^[27] Conversely, numerous sources in the literature state that marital status does not affect the comfort level of patients.^[13,28] In this study, the high comfort level of married patients may be explained by the presence of social support.

The trait anxiety scores of the patients exhibited a statistically significant difference in terms of employment status. Non-employed patients showed higher trait anxiety scores when compared with employed patients. The elevated trait anxiety among non-employed patients is hypothesized to stem from economic concerns, compounded by future anxieties related to the CA procedure. In the literature, there are studies that both support and contradict our findings in terms of the significant difference between employment status and trait anxiety.^[27,29]

The state anxiety scores of patients who interpreted their health as poor during the immobile period were higher than those of patients who interpreted their health as good. Likewise, the comfort scores of patients with negative health interpretations were lower than those of patients with positive health interpretations. The difference in both state anxiety and comfort levels, on the basis of how patients interpreted their health during the immobile period, was found to be statistically significant. Although objective data obtained from patients are important, patients' subjective experiences must be understood in order to provide appropriate care and ensure patient compliance. Hence, how patients interpret their health and perceive the procedures and care provided to them should be considered.^[17] In this study, the high anxiety and low comfort levels observed in patients who perceived their health as poor during the immobile period could be attributed to the persistence of back, waist, and neck pain caused by lying on their back immobile, following the CA procedure.

The trait anxiety scores of patients with prior knowledge of angiography were higher than those of patients without such prior knowledge, and a statistically significant difference in trait anxiety scores was observed based on prior knowledge of angiography. The knowledge of procedural details and potential risk situations among patients informed about CA may have heightened their trait anxiety. In the literature, reportedly, patients with intensive care experience following invasive interventions tend to have higher trait anxiety scores.^[30] Moreover, studies have indicated an increase in both trait and situational anxiety with the growing number of angiograms.^[9]

The trait anxiety scores of patients whose angiography planning was urgent were lower than those of patients whose angiography planning was elective; moreover, a statistically significant difference in trait anxiety scores was observed in terms of the type of angiography planning. The difference found in this study may be attributed to the small number of patients in the elective group and the likelihood that this patient group experienced a prolonged diagnosis process. In a separate study, it was argued that waiting for a CA procedure could impact the quality of life and psychological status of patients.^[31]

In this study, there was a weak positive relationship between the state anxiety and trait anxiety scores of patients undergoing CA, a strong negative relationship between comfort and state anxiety, and a weak negative relationship between comfort and trait anxiety. Furthermore, the results of the regression analysis performed to ascertain the cause-and-effect relationship between state anxiety, trait anxiety, and comfort in patients undergoing CA procedures were found to be significant. The total change in comfort level was explained by state anxiety and trait anxiety at a rate of 53.6%. State anxiety was found to decrease the comfort level, whereas trait anxiety did not significantly affect the comfort level. Studies in the literature that demonstrate a negative relationship between comfort and anxiety scores of patients undergoing CA are consistent with our findings.^[16,17] Invasive procedures such as CA cause patients to remain immobilized for a certain period, which negatively affects their sense of security and increases anxiety.^[32] Based on our study results, the impact of the anxiety experienced by patients on comfort levels was 53%; nursing practices aimed at reducing patients' anxiety levels are believed to positively contribute to their comfort levels.

Conclusion

In this study, the state anxiety of patients undergoing CA was slightly above the average, and trait anxiety was close to the average level. The findings revealed that the state anxiety of patients was linked to a decrease in the comfort level, whereas trait anxiety did not significantly affect the comfort level. Nurses must be aware of the existing anxiety in patients undergoing CA and plan interventions accordingly. Furthermore, state or trait anxiety explained the total change in the comfort level of patients at a significant rate. Therefore, nurses should plan interventions to reduce anxiety both before and after CA. Researchers must conduct intervention studies to reduce anxiety in order to enhance the comfort level.

Ethics Committee Approval: The Lokman Hekim Health Sciences Scientific Research Ethics Committee granted approval for this study (date: 13.03.2023, number: 2023/32).

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