



Evaluation of Depression, Anxiety and Sleep Quality Scores in Patients with Cervical Disc Herniation: A Study Conducted in Turkey

Servikal Disk Hernisi Olan Hastalarda Depresyon, Anksiyete ve Uyku Kalitesi Skorlarının Değerlendirilmesi: Türkiye’de Yapılan Bir Araştırma

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ABSTRACT

Aim: Neck pain is one of the most prevalent medical complaints. Chronic pain conditions can lead to depression, anxiety and sleep problems in individuals. Thus, both the pain itself and the psychiatric problems it causes impair the quality of life of the patient. Depression and anxiety can also cause changes in the perception of pain. In this study, we aimed to investigate the effects of cervical disc herniation (CDH), which causes chronic neck pain, on the level of neck disability, sleep quality, anxiety and depression.

Material and Methods: Patients' pain intensity, neck disability indexes, depression and anxiety status, and sleep quality were evaluated using a visual analog scale (VAS), the neck disability index (NDI), Beck Depression Inventory (BDI), beck anxiety inventory (BAI) and the Pittsburgh Sleep Quality Index (PSQI), respectively.

Results: We found a statistically significant relationship between CDH and anxiety, depression and sleep quality. In addition, we found higher levels of pain, anxiety and depression in the group with poor sleep quality.

Conclusion: For optimal treatment approaches of patients with chronic neck pain, accompanying sleep disorder, depression and anxiety should also be evaluated.

Keywords: Neck pain, Cervical disc herniation, Depression, Anxiety, Sleep disorder

ÖZ

Amaç: Boyun ağrısı en sık görülen tıbbi şikayetlerden biridir. Kronik ağrı durumları bireylerde depresyon, anksiyete ve uyku sorunlarına yol açabilir. Böylece hem ağrının kendisi hem de yol açtığı psikiyatrik sorunlar hastanın yaşam kalitesini bozmaktadır. Depresyon ve anksiyete de ağrı algısında değişikliklere neden olabilir. Bu çalışmada kronik boyun ağrısına neden olan servikal disk hernisinin (SDH) boyun özürülülük düzeyi, uyku kalitesi, depresyon ve anksiyete üzerine etkilerini araştırmayı amaçladık.

Gereç ve Yöntemler: Hastaların ağrı şiddeti, boyun özürülülük indeksleri, depresyon ve anksiyete durumları ve uyku kaliteleri sırasıyla görsel analog skala (GAS), boyun özürülülük indeksi (BÖİ), Beck Depresyon Envanteri (BDE), Beck anksiyete envanteri (BAE) ve Pittsburgh Uyku Kalitesi İndeksi (PUKİ) kullanılarak değerlendirildi.

Bulgular: SDH ile anksiyete, depresyon ve uyku kalitesi arasında istatistiksel olarak anlamlı bir ilişki bulduk. Ayrıca uyku kalitesi düşük olan grupta daha yüksek düzeyde ağrı, anksiyete ve depresyon bulduk.

Sonuç: Kronik boyun ağrısı olan hastalarda optimal tedavi yaklaşımları için eşlik eden uyku bozukluğu, depresyon ve anksiyete de değerlendirilmelidir.

Anahtar Sözcükler: Boyun ağrısı, Servikal disk hernisi, Depresyon, Anksiyete, Uyku bozukluğu



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INTRODUCTION

About half of the people experience neck pain at least one time in their lifespan (1). Neck pain, the incidence of which is increasing, is observed more frequently in some specific professions. If this pain becomes chronic, it can negatively affect the quality of life, mood and sleep quality of the patient (2).

One of the considerably important causes of chronic neck pain is cervical disc herniation (CDH). CDH is caused by expulsion of nucleus pulposus of the intervertebral disc in the cervical spine. This can lead to compression of the nerve roots. Although there are broad classifications to define the terminology, we can divide disc herniations into the following subcategories: bulging, protrusion, extrusion and sequestration (3). The prevalence of CDH increases with age and is most commonly observed in the 4th and 5th decades of life. Women account for about 60% of cases (4). CDH may present with pain in the neck or radiating from the neck to the arm and fingers. The pain may be sharp or dull in character. Complaints such as numbness and loss of sensation, may accompany the pain or may be a primary complaint. Flexion of the head may reveal or exacerbate these complaints (5).

Depression and anxiety are very common health problems all over the world. In cases of chronic pain, the frequency of major depression, anxiety and sleep problems may increase (6). While these psychiatric comorbidities may complicate CDH and pain management, they may also create negative differences in pain perception. In this study, we aimed to reveal the relationship between CDH and chronic neck pain and psychiatric pathologies such as depression, anxiety and sleep disorders. Thus, clinicians will look at patients presenting with CDH and chronic neck pain from a wider range and plan their treatment accordingly. The difference of the present study from other studies with similar subjects and content in the literature is that it evaluates the patients' neck pain and disability, depression and anxiety levels according to whether their sleep quality is good or bad.

MATERIAL and METHODS

The study consisted of 46 patients (8 men, 38 women) who met the inclusion criteria. A control group was formed from 50 participants who were similar to the patient group in terms of characteristics such as gender and age. After the approval of the ethics committee, patients were started to be included in the study between 15 June 2021 and 15 December 2021. A written informed consent form was obtained from all participants.

Participants

The study included 46 patients who applied to Hatay Training and Research Hospital Physical Medicine and Rehabil-

itation outpatient clinic with the complaint of neck pain and were diagnosed with cervical disc herniation. The patients were diagnosed with CDH after anamnesis, detailed physical and neurological examination, cervical X-Ray graphy and cervical MRI examinations. Complete blood count, erythrocyte sedimentation rate and serum C-reactive protein (CRP) levels were evaluated to exclude rheumatic diseases. The control group consisted of healthy hospital personel and their relatives.

The following were accepted as exclusion criteria in the study; serious psychiatric illness and receiving medical treatment for it, extruded and/or sequestrated cervical disc herniation, having undergone cervical disc surgery, kyphosis or scoliosis, neurologic deficit, inflammatory rheumatologic disease, cardiovascular problems, pregnancy, malignancy or infection, physical therapy in the last 3 months and a history of endocrine disease (thyroid, parathyroid or diabetes). The present study was approved by the Clinical Study Ethics Committee of Hatay Mustafa Kemal University (approval no. 06, dated May 06, 2021).

Evaluations

Demographic data, height and weight values of the participants were questioned and recorded. Body mass indexes (BMI) were determined by dividing their weight by the square of their height.

Pain intensity was evaluated by visual analog scale VAS (7). Anxiety levels of the participants were assessed with Beck Anxiety Inventory (BAI), depression levels were assessed via Beck Depression Inventory (BDI), and sleep quality was assessed via Pittsburgh Sleep Quality Index (PSQI). Disability status due to CDH was also evaluated with the Neck Disability Index (NDI).

BDI includes 21 items: items between 1 and 13 assess depressive mood, while items between 14 and 21 evaluate physical symptoms. Total score varies between 0 and 63. 1-10 points are considered normal. 11-16 points, 17-20 points 21-30 points, 31-40 points and over 40 points reveal mild mood disturbance, borderline depression, moderate depression, severe depression and extreme depression, respectively (8, 9).

With BAI, common symptoms of anxiety are questioned. The total score is calculated by summing the scores from 21 items. 0 to 21 points assess low anxiety. 22 to 35 points assess moderate anxiety and >36 points assess worrying anxiety levels (10).

According to PUKI, the total score ranges from 0 to 21, and scores equal to or greater than 6 indicate poor sleep quality (11).

The Neck Disability Index (NDI) is done to evaluate the impact of neck pain on the patient's daily life. NDI consists of

10 items and each item is scored between 0-5 points. Total score varies between 0-50. As a result of the evaluation, the level of the disability is classified as no disability (0 to 4 points), mild (5 to 14 points), moderate (15 to 24 points), severe (25 to 34 points) and complete (>34 points) (12).

Statistical Analyses

Descriptive statistics were presented as arithmetic mean \pm standard deviations and median (minimum-maximum) for continuous variables, and as the frequency and percentage for categorical variables. Conformity of continuous variables with normal distribution was checked by the Shapiro Wilk test. If the data conformed to the normal distribution, the Independent Samples t-Test (Student's t-Test) was used to compare the mean of the patient and control groups in terms of continuous variables, and if not, the Mann Whitney-U Test was used. The Pearson Chi-Square Test and Fisher's Exact Test were used to compare patient and control group percentages in terms of categorical variables. The direction and strength of the relationship between continuous variables were determined by the Pearson correlation coefficient (r) if the data were normally distributed, and by the Spearman correlation coefficient (R_s) if they were not normally distributed. Mukaka's guide was used to specify the size of the correlation coefficient and was shown in Table 6 (13). The statistical significance limit was accepted as $p < 0.05$. SPSS 21 statistical package program was used for all statistical analyses.

Table 1: Demographic Data

Demographic Characteristics		Patients (n=46)	Control (n=50)	p
Gender, n(%)	Male	8 (17.4)	8 (16.0)	0.855*
	Female	38 (82.6)	42 (84.0)	
Marital Status n(%)	Married	39 (84.8)	42 (84.0)	0.916*
	Single or Divorced	7 (15.2)	8 (16.0)	
Age (year \pm SD)		40.20 \pm 9.21	42.46 \pm 12.28	0.307**
BMI (kg/m ² \pm SD)		26.23 \pm 3.09	26.11 \pm 3.15	0.846**

BMI: Body Mass Index, * Pearson Chi-Square Test, ** Student's t-Test

Table 2: Results of NDI, BDI, BAI and PSQI of patient and control groups

Indices	Patients (n=46)	Control (n=50)	p
NDI (score \pm SD)	23.01 \pm 7.69	3.38 \pm 1.87	<0.001*
BDI (score \pm SD)	11.02 \pm 7.42	6.16 \pm 3.14	0.001*
BAI (score \pm SD)	14.35 \pm 9.22	5.04 \pm 3.02	<0.001*
PSQI (score \pm SD)	9.39 \pm 4.47	3.56 \pm 2.33	<0.001*

NDI: Neck Disability Index, **BDI:** Beck Depression Inventory, **BAI:** Beck Anxiety Inventory, **PSQI:** Pittsburgh Sleep Quality Index, * Mann Whitney U-Test

RESULTS

The study consisted of 46 patients (8 men, 38 women) who met the inclusion criteria. A control group was formed from 50 participants (8 male, 42 female). Of the patient group, 39 (84.8%) were married, 5 (10.9%) were single, and 2 (4.3%) were divorced. In the control group, the rate of married people was 84% (42 participants). While the mean age of the patient group was 40.20 \pm 9.21, it was 42.46 \pm 12.28 in the control group. While the mean BMI was 26.23 \pm 3.09 in the patient group, it was 26.11 \pm 3.15 in the control group. It was observed that the gender, marital status, age and BMI distributions of the patient and control groups were statistically similar (Table 1).

NDI, BDI, BAI and PSQI mean scores were statistically significantly higher in the patient group than in the control group. While the mean NDI was 23.01 \pm 7.69 in the patient group, it was 3.38 \pm 1.87 in the control group. While the mean BDI was 11.02 \pm 7.42 in the patient group, it was 6.16 \pm 3.14 in the control group. While the mean BAI was 14.35 \pm 9.22 in the patient group, it was 5.04 \pm 3.02 in the control group. When we evaluated it in terms of PSQI, it was 9.39 \pm 4.47 in the patient group, while it was 3.56 \pm 2.33 in the control group (Table 2).

While the mean duration of pain experienced in the patient group was 56.43 \pm 55.61 months, the duration of diagnosis was 23.02 \pm 21.31 months. The mean VAS was 7.15 \pm 1.26 (Table 3).

Table 3: Pain duration, Diagnosis time and VAS of the patients

Pain's Characteristics	Findings
Pain duration (months \pm SD)	56.43 \pm 55.61
Median (Min-Max)	48 (3-240)
Diagnosis time (months \pm SD)	23.02 \pm 21.31
Median (Min-Max)	15 (3-84)
VAS (Scale \pm SD)	7.15 \pm 1.26
Median (Min-Max)	7 (5-9)

VAS: Visual Analog Scale, **X:** Mean, **SD:** Standard Deviation

According to PSQI, 11 patients had good sleep quality and 35 patients had poor sleep quality. It was observed that the gender, marital status, age and BMI distributions of the groups with good and bad sleep quality were statistically similar ($p=0.374$, $p=0.171$, $p=0.231$, $p=0.379$, respectively) (Table 4).

While the mean duration of pain was 92.18 ± 84.52 months in the good sleep quality group, it was 45.20 ± 38.06 months in the poor sleep quality group. While the mean time to diagnosis was 33.27 ± 14.79 months in the good sleep quality group, it was 19.80 ± 22.18 months in the poor sleep quality group. The mean VAS, NDI, BDI and BAI values in the good sleep quality group were 6.18 ± 1.08 , 15.82 ± 2.75 , 5.36 ± 2.77 , 7.64 ± 2.38 , respectively. In the poor sleep quality group, mean VAS, NDI, BDI and BAI values were 7.46 ± 1.17 , 25.27 ± 7.34 , 12.80 ± 7.55 , 16.46 ± 9.58 , respectively (Table 5).

The mean values of VAS, NDI, BDI and BAI were statistically significantly higher in the poor sleep quality group than in the good sleep quality group ($p=0.004$, $p<0.001$, $p=0.001$, $p=0.001$, respectively). The diagnosis time was found to be statistically significantly lower in the poor sleep quality group than in the good sleep quality group ($p=0.015$). There was no statistically significant difference between the two groups in terms of pain duration ($p=0.075$).

There is a high level of positive correlation between VAS and NDI ($r_s=0.741$, $p=0.001$) and between NDI and PSQI ($r_s=0.740$, $p<0.001$). There is a moderate positive correlation between VAS and PSQI ($r_s=0.530$, $p<0.001$), BDI and PSQI ($r_s=0.599$, $p<0.001$), and BAI and PSQI ($r_s=0.574$, $p<0.001$). There is a low positive correlation between VAS and BDI ($r_s=0.374$, $p=0.010$), VAS and BAI ($r_s=0.317$, $p=0.032$), NDI and BDI ($r_s=0.441$, $p=0.002$), NDI and BAI ($r_s=0.353$, $p=0.016$), and BDI and BAI ($r_s=0.418$, $p=0.004$) (Table 6).

DISCUSSION

Cervical disc herniation is one of the most common causes of neck pain. Chronic pain conditions can lead to psychological problems, deterioration in sleep quality and limitations in activities of daily living. Many studies have shown the relationship between chronic pain, neck or low back pain and psychiatric conditions. However, there are very few studies examining the relationship between CDH, psychiatric diseases and sleep quality.

This study was designed to determine the relationship between pain intensity, neck disability index, depression, anxiety and quality of sleep in patients with CDH. We found that the anxiety and depression scores were higher in the patient group, and their sleep quality was worse. This shows that chronic pain conditions such as CDH and deteri-

Table 4: Demographic data, Age and BMI of patients with good and poor sleep quality

		Group Quality of Sleep		p
		Good (0-5)	Poor (6-21)	
Gender, n (%)	Male	3 (27.3)	5 (14.3)	0.374*
	Female	8 (72.7)	30 (85.7)	
Marital Status, n (%)	Married	11 (100.0)	28 (80.0)	0.171*
	Single or Divorced	0 (0.0)	7 (20.0)	
Age (year±SD)		42.36±5.28	39.51 ± 10.10	0.231**
BMI (kg/m ² ±SD)		26.96±2.83	26.00 ± 3.17	0.379**

BMI: Body Mass Index, * Fisher's Exact Test, ** Student's t-Test

Table 5: Pain duration, Diagnosis time, VAS, NDI, BDI, BAI of groups with good and poor sleep quality

Parameters	Group Quality of Sleep		p*
	Good (0-5)	Poor (6-21)	
Pain duration (months±SD)	92.18 ± 84.52	45.20 ± 38.06	0.075
Diagnosis time (months±SD)	33.27 ± 14.79	19.80 ± 22.18	0.015
VAS (score±SD)	6.18 ± 1.08	7.46 ± 1.17	0.004
NDI (score±SD)	15.82 ± 2.75	25.27 ± 7.34	<0.001
BDI (score±SD)	5.36 ± 2.77	12.80 ± 7.55	0.001
BAI (score±SD)	7.64 ± 2.38	16.46 ± 9.58	0.001

VAS: Visual Analog Scale, **NDI:** Neck Disability Index, **BDI:** Beck Depression Inventory, **BAI:** Beck Anxiety Inventory, * Mann Whitney U-Test

Table 6: Correlation size between VAS, NDI, BDI, BAI and PSQI

		VAS	NDI	BDI	BAI	PSQI
VAS	Correlation coefficient (rs)	1,000	0.741	0.374	0.317	0.530
	p	-	<0.001	.010	.032	<0.001
NDI	Correlation coefficient (rs)		1.000	0.441	0.353	0.740
	p		-	0.002	0.016	<0.001
BDI	Correlation coefficient (rs)			1.000	0.418	0.599
	p			-	0.004	<0.001
BAI	Correlation coefficient (rs)				1.000	0.574
	p				-	<0.001
PSQI	Correlation coefficient (rs)					1.000
	p					-

0.90 to 1.00 (-0.90 to -1.00): Very high positive/negative correlation

0.70 to 0.90 (-0.70 to -0.90): High positive/negative correlation

0.50 to 0.70 (-0.50 to -0.70): Moderate positive/negative correlation

0.30 to 0.50 (-0.30 to -0.50): Low positive/negative correlation

0.00 to 0.30 (-0.00 to -0.30): Insignificant correlation

VAS: Visual Analog Scale, **NDI:** Neck Disability Index, **BDI:** Beck Depression Inventory, **BAI:** Beck Anxiety Inventory, **PSQI:** Pittsburgh Sleep Quality Index, **rs:** Rank Correlation Coefficient, **p:** Spearman Correlation Analysis

oration in sleep quality may pave the way for mood changes such as depression and anxiety in patients. As expected, we found the mean NDI to be higher in the CDH group. Accordingly, these results, we found positive high-moderate and low-level relationships between VAS, NDI, PSQI, BDI and BAI.

Parikh and Amarnath found a positive correlation between neck pain and anxiety in a study of 154 computer workers (6). Lerman et al. found that more than half of the participants suffered from depression and anxiety in their study which included 428 patients with chronic pain (14). Elbinoune et al. investigated the prevalence of anxiety and depression in 80 patients with chronic neck pain. They found the depression rate 55.7% and the anxiety rate 68.4%. They evaluated these rates as high (15).

Liu et al. reviewed 13 studies involving 2339 patients and 3290 healthy people to evaluate the possible relationship between neuropathic pain and mood disorders. As a result, it was determined that chronic pain conditions may adversely affect the mental health of patients and may also predispose them to depression and anxiety, so the quality of life of the person deteriorates (16). Dimitriadis et al. found a relationship between pain severity and anxiety level in a study that included 45 patients with chronic neck pain (17). Supporting the study of Dimitriadis et al., a low positive correlation was found between pain and depression or anxiety in our study. Also, Batcik and Özdemir found a positive correlation between pain severity and anxiety and depression levels in a study that included patients with acute low back pain (18). Talvari et al., in their study, which included 200

elderly participants with neck pain over the age of 60, found that older individuals with neck pain were more prone to symptoms of anxiety and depression (19).

Blozik et al. suggested that depression and anxiety are important triggers of neck pain (20). Moreover, Gerrits et al. suggested that compared to other anatomical localizations, neck pain may reveal anxiety and depression more (21).

Psychiatric disorders can cause or exacerbate chronic non-specific pain. A bidirectional relationship has been reported between pain and psychiatric disorders. It is emphasized that psychiatric disorders can change pain sensitivity, especially anxiety reduces tolerance (22, 23). It is thought that dysfunction in the autonomic nervous system and hypothalamic-pituitary-adrenal axis of patients with anxiety and depression may be related to the change in pain perception. In addition, when neurotransmitters such as norepinephrine (NE) and 5 hydroxytryptamine (5-HT) decrease, loss of mechanisms to eliminate pain and development in psychiatric diseases such as anxiety and depression can be observed. High levels of systemic inflammatory markers in the blood of patients with chronic pain and mood disorders may indicate that common pathogenetic mechanisms may be responsible (16).

Similar to our work, Sayilir found in his study that the perceived stress levels in patients with chronic neck pain were significantly higher than in healthy controls. Also, he found that physical medicine & rehabilitation (PMR) applications provide an improvement in these perceived stress levels. At the end of PMR applications, NDI scores were also improved (24).

In chronic pain conditions, the frequency of sleep disturbances and daytime sleepiness is increased. These sleep-related conditions can also cause many serious conditions that should be taken into account, such as falls in elderly individuals (24). We found that 35 (76%) participants in the patient group had poor sleep quality. Mean VAS values were also higher in patients with poor sleep quality. While this may indicate that patients cannot sleep well due to pain, it may also suggest that patients with bad sleep quality may have a change in their perception of pain. Also, patients with poor sleep quality had higher mean anxiety and depression scores. This may show that poor sleep quality, anxiety and depression are in mutual interaction.

Similar to our study, Muñoz-Muñoz et al. researched pain and disability levels and sleep quality in individuals with neck pain, and found that sleep quality was poorer in patients than in healthy people (25). Artner et al. evaluated 1016 patients with chronic low or upper back pain, retrospectively. Similar to our study, they showed a significant association between pain intensity and sleep disorder (26). Auvinen et al. declared that poor sleep quality was a risk factor for low back or neck pain, and they also discussed that an improvement in sleep quality may be beneficial for the treatment of these pains (27). Valenza et al., in their study examining the change in sleep quality of 59 neck pain patients, emphasized that the cycle of pain and sleep disturbance should be taken into account in the treatment of these patients (28).

De Heer et al. showed that the presence of depression and anxiety increased the severity of existing pain and pain-related disability (29). Seçer et al. found a low to moderate negative correlation between pain score and sleep quality in chronic neck pain patients, and a low positive correlation between pain score and anxiety score (2).

According to Yalçınkaya et al., there was a positive correlation between PSQI and NDI, BAI and BDI. They also stated that impaired sleep quality may have a function in the pathogenesis of chronic pain (30). In our study, we found a relationship between sleep disorder severity and depression, anxiety and disability levels. Moreover, we found that patients with worse sleep quality had higher scores for pain, disability, depression and anxiety compared to those with better sleep quality.

We found that in patients with poor sleep quality, the mean duration of pain was shorter. In addition, the time to diagnosis of CDH was shorter in patients with poor sleep quality. This may suggest that the accompanying sleep quality deterioration leads to earlier treatment seeking in patients with chronic pain.

Adequate number of patients were included in the study in terms of statistical significance, but the number of patients

could have been higher to minimize errors. Other psychological factors such as insomnia that may be associated with CDH could also be investigated. The effect of treatment approaches for anxiety, depression and sleep problems on pain could be investigated. Conditions such as work related factors that could affect psychological factors and sleep quality could also be evaluated in the study. Therefore, studies that will involve more participants, evaluate the efficacy of treatment and with longer follow-up periods will contribute more to the literature in terms of investigating the relationship between CDH and anxiety, depression and sleep quality.

We found a statistically significant relationship between CDH and anxiety, depression and sleep quality. In addition, we found higher levels of pain, anxiety and depression in the group with poor sleep quality due to CDH. As a result, we found positive high-moderate and low-level relationships between VAS, NDI, PSQI, BDI and BAI. Thus, clinicians should approach patients presenting with CDH and neck pain from a broader perspective and evaluate them in terms of anxiety, depression, and sleep quality. Because with a two-way interaction, depression and anxiety can lower the pain threshold or the severity of pain can reveal the psychiatric problems of the patients. It will be possible to get better clinical results with the detection and treatment of these accompanying conditions.

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Author Contributions

Concept: **Alper Uysal, Murat Guntel**, Design: **Alper Uysal, Murat Guntel**, Data Collection or Processing: **Alper Uysal**, Analysis or Interpretation: **Alper Uysal, Murat Guntel**, Literature Search: **Alper Uysal, Murat Guntel**, Writing: **Alper Uysal, Murat Guntel**.

Conflicts of Interest

Authors declare that there is no conflict of interest. The second author of the study died in Hatay on February 6, 2023 due to the 7.7 magnitude earthquake.

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Ethical Approval

The present study was approved by the Clinical Study Ethics Committee of Hatay Mustafa Kemal University (approval no. 06, dated May 06, 2021). The guidelines of the Declaration of Helsinki were followed during the conduct of this study. A written informed consent form was obtained from all participants.

Review Process

Extremely peer-reviewed and accepted.

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