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Dermatoglyphic features in migraine

Migrende dermatoglifik özellikler

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SUMMARY

Objective: Migraine is one of the most encountered causes of headaches. Usually, it shows up among young adults and may cause a decline in life standards and workforce loss. The exact cause of the disease is not known, and environmental factors and genetic predisposition are etiologically blamed. Dermatoglyphics are special shapes created by epidermis ridges. They occur during the intrauterine period and remain invariably for lifetime. However, several disorders that develop depending on genetic predisposition may cause deteriorations in the shape and ridge of the dermatoglyphics. Thus, dermatoglyphic samples of the fingertip and palm of patients diagnosed with migraine were compared with control group and presented in accompanying with literature.

Method: The dermatoglyphic data obtained from 51 patients and 70 healthy people (control group), with digital scanner were transferred to computer environment. By using ImageJ program, atd, dat, adt angles, a-b ridge count, sample types of all fingers and ridge counts were calculated. Obtained data were loaded into SPSS 15.0 program. T-test, Mann-Whitney U and chi-square were used in statistical assessment.

Results: Both right and left hand fingerprint ridge counts, a-b ridge counts and total ridge counts of the patients with migraine increased. This increase was also significant except for right hand little finger. Furthermore, atd angle in both hands of patients with migraine was statistically and significantly higher than healthy control group. However, the most frequent sample type in both groups except for men's right hand was ulnar loop.

Conclusions: The deviation from normality in the distribution of dermatoglyphic samples support the genetic predisposition blamed in migraine etiology. Also, by studying the dermatoglyphic samples, it is likely to detect the individuals with genetic predisposition in society. Hence, it may be provided for the group in risk to avoid from the circumstances and environments that will trigger their disease.

Keywords: Migraine, etiology, palmar angles, dermatoglyphics

ÖZET

Amaç: Migren başağrılarının en sık karşılaşılan nedenlerinden biridir. Genellikle genç erişkinlerde görülür ve yaşam standartları ile işgücünde azalmaya neden olabilir.Hastalığın tam olarak nedeni bilinmemekle birlikte çevresel faktörler ve genetik yatkınlık suçlanmaktadır.Dermatoglifikler epidermis çizgileri tarafından oluşturulan özel şekillerdir.İntrauterin dönemde oluşup yaşam boyu kalırlar.Ancak pek çok hastalık genetik yatkınlığa bağlı olarak dermatoglifiklerin şekil ve çizgilerinde bozulmaya neden olabilir.Bu nedenle çalışmada migrenli hastaların avuçiçi ve parmakucundan alınan dermatoglifik örnekler sağlıklı kontrol grubuyla karşılaştırılmış ve literatür eşliğinde sunulmuştur.

Yöntem: Elli bir hasta ve 71 sağlıklı kontrol grubundan dijital tarayıcı yöntemiyle alınan dermatoglifik örnekler bilgisayar ortamına aktarıldı.ImageJ programı kullanılarak; atd, dat, adt açıları, a-b çizgi sayısı, tüm parmakların örnek tipleri ve çizgi sayıları hesaplandı.Elde edilen veriler SPSS 15 programına yüklendi. İstatistiksel değerlendirmede T testi, Mann Whitney U ve

ki-kare testi kullanıldı.
Bulgular: Migrenli hastalarda hem sağ hem de sol el parmakizi çizgi sayıları, a-b çizgi sayıları ve total çizgi sayıları artmış olarak bulundu.Bu artış sağ el küçük parmağı dışında anlamlıydı.Ayrıca migrenli hastalarda her iki eldeki atd açısı kontrol grubuna göre istatistiksel olarak anlamlı bir şekilde kontrol grubundan daha yüksekti.Ancak erkeklerin sağ eli dışında en sık bulunan örnek tipi ulnar ilmekti.
Sonuç: Dermatoglifik örneklerin dağılımında normalden sapma görülmesi, migren etyolojisinde suçlanan genetik yatkınlığı desteklemektedir.Aynı zamanda dermatoglifik örneklerin çalışılması ile; toplumda genetik yatkınlığı olan bireyleri tanımak olasıdır.Bundan dolayı risk altındaki grubun hastalığı tetikleyici durum ve çevreden sakınmalarının sağlanması mümkün olabilir.
Anahtar sözcükler: Migren, etyoloji, palmar açılar, dermatoglifikler

INTRODUCTION

Migraine is a frequently encountered headache and may be seen in 18% of women and 6% of men. Migraine is more common than several chronic diseases, and it causes a decline in the quality of life and serious workforce loss, especially between 30 to 49 years old individuals[1-5]. The etiology of migraine has not yet been fully revealed, and the studies for revealing the etiology have still been continuing[6-12]. Both genetic and environmental factors were blamed for migraine development. In studies especially on family and twins, it has been claimed that genetic predisposition may have an important role in the occurrence of migraine[13-14].

Genetically assigned and remaining invariably for lifetime, epidermis ridges develop in the 3rd and 5th months of fetal life. However, the special shapes created by epidermis ridges that develop from ectoderm (dermatoglyphics) are affected by count and shape anomalies and may differ from normal population[15-16].
In dermatoglyphic studies, the dermatoglyphic features of that society gain importance. There has been no study on dermatoglyphic features of migraine patients in our society. For this reason, dermatoglyphic samples of the fingertip and palm of migraine patients were compared with control group and presented in company with literature in order to elucidate the genetic origin of migraine in the etiology of which genetic factors were blamed.

MATERIAL AND METHODS

51 patients who have no other disorder but migraine were informed about the study and included in the study after their approval. The average age of the patients was 36.74 ± 8.73 (between 18-56 years old), 31 women and 20 men. In control group, there were 70 people who have no migraine or neurological disease history, nor their families. The average age of the control group was 24.05 ± 7.92 (between 18-52 years old), 40 women and 30 men.

Dermatoglyphic samples were obtained using electronic scanner (CanoScan LIDE 60 model, Canon). During the sampling, thumb was approximately 30-40 degree and the other fingers were 10-15 degree in abduction, and palm was in the contact position on the scanner screen.

Total 4 colourful images were recorded at 300 dpi resolution for each patient in the scanning. In the images recorded by jpg format into the computer environment, fingertip sample types, fingertip ridge counts, a-b ridge count, atd, dat and adt angles were found using the Image J program (Figures 1, 2). Fingertip sample types were evaluated as whorl, ulnar loop, radial loop and arch by Cummins and Midlo[17] classification. In the samples except for arch, the counts between the centre of the pattern and triradius were counted and determined (Figure 2). In the samples that have more than one triradius, the side where the ridge count is much was evaluated. The ridge count in the patterns of arch was accepted as zero. The ridge counts in all fingers were summed, and total ridge count (TRC) was obtained. Axial triradius “t” is a point that occurs due to the combination of line bundles coming from three different directions between thenar and hypothenar areas in the palm by making a 120-degree of angle. Obtained data were loaded into SPSS 15.0 program. T-test, Mann-Whitney U and chi-square were used in statistical assessment. The results whose P value is less than 0.05 were accepted as significant.

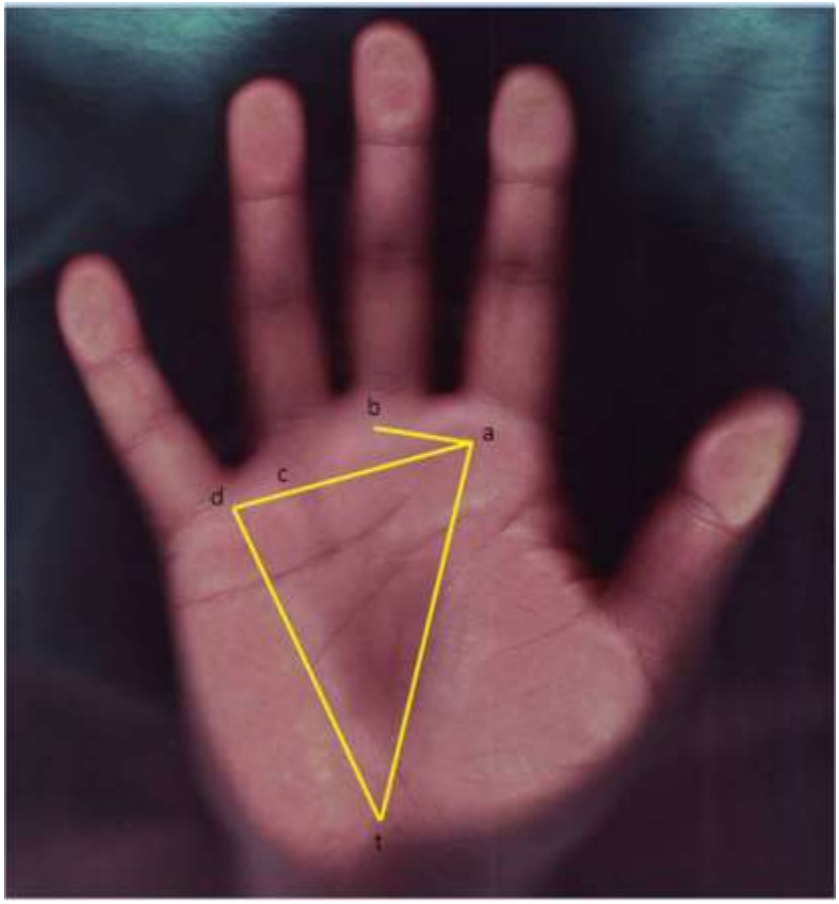

Figure 1: The evaluation of dermal patterns in palm. A and d digital triradiuses were combined with axial triradius (t), and obtained atd, dat and adt angles were measured. The dermal ridges cut across by the line drawn between a and b digital triradiuses were counted and a-b ridge count was found.

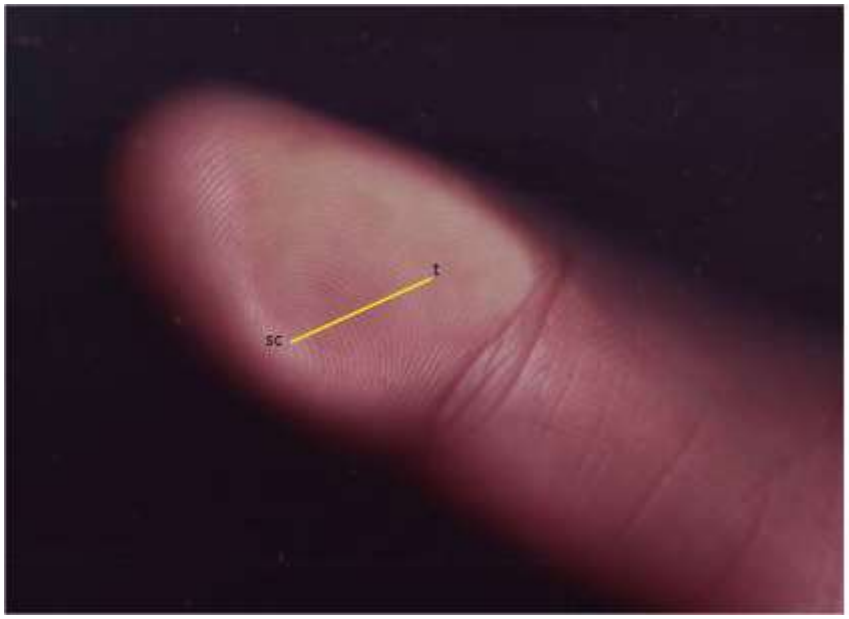

Figure 2: Finding the ridge counts in fingertip samples; the dermal ridge counts cut across by vertical line drawn from the centre of the pattern to the farthest triradius were counted. *Sc : Sample center, t : Triradius.

Table 1: Comparison of the numbers and angles of finger tips and palmar lines in the control group and patients with migraine.

	Patient group/(n=51) Right hand/Mean ±SD	Control group/(n=70) Right hand/Mean ±SD	t	P	Patient group/(n=51) Left hand/Mean ±SD	Control group/(n=70) Left hand/Mean±SD	t	P
Thump	19.94±4.79	14.94±4.62	5.779	0.000*	19.15±4.91	14.48±4.37	5.505	0.000*
Index finger	15.88±8.03	12.87±6.16	2.331	0.021*	14.39±6.38	12.00±6.21	2.068	0.041*
Middle finger	14.96±5.89	12.15±6.33	2.473	0.015*	14.62±6.57	11.75±6.39	2.409	0.018*
Ring finger	16.01±5.88	13.40±5.65	2.474	0.015*	17.78±6.96	13.07±5.91	4.014	0.000*
Little finger	14.21±3.37	13.34±4.50	1.165	0.246	15.82±4.46	13.47±4.03	3.028	0.003*
Total ridge count	81.17±21±24	66.10±22.42	3.733	0.000*	81.66±20.75	64.75±21.16	4.375	0.000*
atd angle (o)	44.50±4.91	42.25±4.53	2.601	0.010*	46.11±4.98	41.14±4.73	5.574	0.000*
dat angle (o)	56.68±4.99	59.87±5.79	-3.175	0.002*	56.35±5.04	60.12±6.40	-3.487	0.001*
adt angle (o)	78.80±5.38	77.62±4.87	1.260	0.210	77.53±4.46	78.45±5.40	-0.993	0.323
a-b ridge count	44.31±5.51	36.27±6.98	6.818	0.000*	48.52±5.89	36.58±6.42	10.446	0.000*

Table 2: The distribution of dermal samples in the right and left hand fingertips of female patients and control groups.

	Samples in the right hand fingertips of the female patients and controls								Samples in the left hand fingertips of the female patients and controls							
	Patient group (n=31)				Control group (n=40)				Patient group (n=31)				Control group (n=40)			
	W	UL	RL	A	W	UL	RL	A	W	UL	RL	A	W	UL	RL	A
Thump	15	16	0	0	21	18	0	1	17	14	0	0	16	22	0	2
Index finger	14	9	2	6	19	9	6	6	11	13	2	5	16	10	6	8
Middle finger	7	20	0	4	6	26	1	7	7	17	2	5	9	19	2	10
Ring finger	12	17	1	1	21	16	1	2	12	14	1	4	12	26	0	2
Little finger	8	23	0	0	9	29	0	2	6	22	1	2	5	34	0	1
Total	**56 (%36)**	**85 (%55)**	**3 (%2)**	**11 (%7)**	**76 (%38)**	**98 (%49)**	**8 (%4)**	**18 (%9)**	**53 (%34)**	**80 (%52)**	**6 (%4)**	**16 (%10)**	**58 (%29)**	**111 (%57)**	**8 (%4)**	**23 (%11)**

Table 3: The distribution of dermal samples in the right and left hand fingertips of male patients and control groups.

	Samples in the right hand fingertips of the male patients and controls								Samples in the left hand fingertips of the male patients and controls							
	Patient group (n=20)				Control group (n=30)				Patient group (n=20)				Control group (n=30)			
	W	UL	RL	A	W	UL	RL	A	W	UL	RL	A	W	UL	RL	A
Thump	13	7	0	0	22	7	0	1	7	13	0	0	24	6	0	0
Index finger	11	7	2	0	18	6	3	3	9	9	2	0	17	8	4	1
Middle finger	8	12	0	0	10	15	1	4	4	16	0	0	9	19	0	2
Ring finger	14	4	0	2	16	10	0	4	6	14	0	0	11	14	0	5
Little finger	4	16	0	0	7	23	4	0	4	16	0	0	5	24	0	1
Total	**50 (%50)**	**46 (%46)**	**2 (%2)**	**2 (%2)**	**73 (%49)**	**61 (%41)**	**4 (%2)**	**12 (%8)**	**30 (%30)**	**68 (%68)**	**2 (%2)**	**0 (%0)**	**66 (%44)**	**71 (%47)**	**4 (%2)**	**9 (%6)**

Table 4: The finger tips, palm ridge count and palmar angles of females in patients with and control groups.

	Patient group/(n=31)	Control group/(n=40)	t-test	P	Patient group/(n=31)	Control group/(n=40)	t-test	P
	Right hand/Mean±SD	Right hand/Mean±SD	t		Left hand/Mean±SD	Left hand/Mean±SD	t	
Thump	20.00±5.38	14.35±4.44	4.845	0.000*	20.51±5.46	13.87±5.01	5.323	0.000*
Index finger	13.70±8.73	12.90±6.42	0.450	0.654	13.22±7.63	11.02±7.08	1.255	0.214
Middle finger	14.77±7.36	12.70±6.80	1.228	0.223	14.16±7.87	10.85±7.10	1.858	0.067
Ring finger	16.51±5.85	14.32±5.51	1.617	0.110	17.09±8.69	13.92±5.60	1.863	0.067
Little finger	14.70±3.69	13.17±5.03	1.425	0.159	15.22±5.32	13.60±4.14	1.448	0.152
Total ridge count	79.96±25.13	66.62±25.04	2.223	0.030*	80.12±26.03	63.25±22.91	2.900	0.005*
atd angle (o)	43.64±4.24	42.99±4.53	0.621	0.537	45.03±5.40	41.99±4.49	2.587	0.012*
dat angle (o)	57.79±5.11	60.22±6.61	-1.693	0.095	56.70±5.13	59.68±6.85	-2.015	0.048*
adt angle (o)	78.56±4.24	76.45±5.27	1.671	0.099	78.25±3.91	78.21±6.20	0.037	0.970
a-b ridge count	45.77±5.12	37.92±7.76	4.861	0.000*	49.64±4.60	37.75±6.61	8.532	0.000*

Table 5: The finger tips, palm ridge count and palmar angles of males in patients with and control groups.

	Patient group/(n=20)	Control group/(n=30)	Mann Whitney U)	P	Patient group/(n=20)	Control group/(n=30)	Mann Whitney U	P
	Right hand/Mean±SD	Right hand/Mean±SD	Z (-)		Left hand/Mean±SD	Left hand/Mean±SD	Z(-)	
Thump	19.85±3.84	15.73±4.82	-2.815	0.005*	17.05±2.94	15.30±3.24	-1.906	0.057
Index finger	19.25±5.46	12.83±5.92	-3.685	0.000*	16.20±3.10	13.30±4.60	-2.865	0.004*
Middle finger	15.25±2.38	11.43±5.68	-2.620	0.009*	15.35±3.85	12.96±5.17	-1.047	0.295
Ring finger	15.25±6.00	12.16±5.68	-2.227	0.026	18.85±2.53	11.93±6.21	-4.776	0.000*
Little finger	13.45±2.70	13.56±3.76	-0.979	0.328	16.75±2.51	13.30±3.94	-3.326	0.001*
Total ridge count	83.05±13.55	65.40±18.75	-3.290	0.001*	84.05±7.30	66.76±18.77	-4.353	0.000*
atd angle (o)	45.85±5.65	41.28±4.42	-2.834	0.005*	47.78±3.80	40.01±4.87	-4.364	0.000*
dat angle (o)	54.96±4.37	59.41±4.54	-3.348	0.001*	55.80±4.99	60.71±5.81	-3.112	0.002*
adt angle (o)	79.17±5.70	79.17±3.83	-0.337	0.736	76.40±5.10	78.77±4.19	-1.725	0.085
a-b ridge count	42.05±5.43	34.06±5.11	-4.111	0.000*	46.80±7.27	35.03±5.92	-4.998	0.000*

***W:Wworl, UL: Ulnar loop, RL: Radial loop, A: Arch.**

RESULTS

There was a statistically significant increase in the a-b ridge count, total ridge count and ridge count on all fingertips on both hands of patients with migraine except the right hand little finger. Also, patients with migraine of both hands of the measured atd angle was higher than in healthy controls ($p<0.05$). Dat angle in right and left hand of patients were lower than in healty controls (Table 1).

Ulnar loop was observed the most sample type in both female patients and healthy controls at the fingertips of the right and left hand. Radial loop was the least common sample in both groups (Table 2). Unlike women, while the most commonly observed pattern type on the right hand fingers in male patients was whorl, ulnar loops were the most commonly observed pattern type on the left hand fingers. Radial loop and arch were the least common sample in male patients. Radial loops and arch samples is equal incidence was 2% in right hand. There was no arch sample on the left hand of male patients (Table 3).

There was an increase in both hand, a-b ridge counts, total ridge counts, ridge

counts of thump fingertip of female patients diagnosed with migraine when compared to female controls ($p<0.05$) Atd angle in left hand of female patients was higher than in healty female controls ($p<0.05$) (Table 4).

In both hand, total ridge counts, a-b ridge counts and atd angle of male patients were higher when compared to controls ($p<0.05$). The ridge count of finger tips had increased in the right hand thump, ring and little fingers of male patients ($p<0.05$). The ridge count of finger tips had increased in the left hand middle, ring and little fingers of male patients ($p<0.05$) (Table 5).

DISCUSSION

As dermatoglyphics differ by societies, it becomes important to compare the results of the studies that belong to a society in the studies carried out in this field. However, we have not yet encountered any research on the dermatoglyphic features of the migraine patients in Turkey. On the other hand, there are studies reporting that dermatoglyphic analyses may be used as an assistive method in the evaluation of diagnosis, prognosis and treatment of several diseases such as schizophrenia, down syndrome, autism, various types of cancer, idiopathic epilepsy, panic disorder, multiple sclerosis and congenital heart diseases in which genetic predisposition play role in its etiology[6-11].

Özyurt et al[18] reported that left hand a-b ridge count of male schizophrenic patients was lower than control group. It was also found that although fingertip total ridge counts were at normal limits in men, there was a decline in women.

Fearon et al[16]. found that total a-b ridge counts were lower in schizophrenic patients. They claimed that increase in the development of risk in individuals was parallel with the decrease in a-b ridge counts.

Sabanciogullari et al[19, 20] found that there was an increase in the ridge count between a-b points and the ridge count in all fingers of both hands of the patients with multiple sclerosis and idiopathic epilepsy. They also reported that while the dat angle increased in both hands of the patients with multiple sclerosis, it decreased in the patients with idiopathic epilepsy. In the study group, a-b ridge count and total ridge count of both hands of male and female migraine patients were prominently higher than the normal population. In addition, atd angle in both hands of the migraine patients were statistically and significantly higher than healthy control group.

Elsaadany et al[21] reported that the ridge counts in both hands of male and female patients with rheumatoid arthritis, but this decline was statistically significant in the right hands of men and in the left hands of women. Besides, they found that while a-b ridge count declined in both hands of female patients, it decreased in left hand of male patients. They also claimed that the variations especially in total ridge count are based on genetic factors rather than environmental factors.

Todd et al[22] claimed that the patterns of arch are more likely to show up in clinical syndromes in which embryological development stops and developmental maturation decrease. Likewise, Sanches Cascos pointed out that there was an increase in the arch patterns especially in pulmonary stenosis cases in congenital heart diseases[23]. On the other hand, Varma et al[24] found that although the arch patterns in fingertips of the 250 schizophrenic patients were at similar frequency with those of control group, loop patterns increased. Elsaadany et al[21] indicated that ulnar loop rate decreased and arch patterns increased in both men and women with rheumatoid arthritis.

Ravindranath et al[25] suggested that there was a statistically significant decline in loop patterns in both hands of male patients with rheumatoid arthritis.

The dermatoglyphic features of migraine patients show various differences from normal population. These differences support the blamed genetic predisposition in migraine etiology and they are also cheap and non-invasive anatomic markers that can be used to detect the individuals in society who have innate predisposition to migraine.

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