Wasit Journal for Science & Medicine **2010 3 (1): (51 - 59)**

GENETICS OF EPIDERMAL RIDGES STUDY IN MYOPIC PATIENTS

KAREEM HAMED GHALI
UNIVERSITY OF WASSIT,COLLEGE OF MEDICINE

دراسة وراثة الخطوط الجلدية في مرضى قصر البصر

كريم حمد غالي – جامعة واسط / كلية الطب

الخلاصة

درست الخطوط الجلدية في ١٠٠ حالة مصابة بقصر البصر بالاضافة الى ١٠٠ حالة سليمة في العراق . العينات المرضية اظهرت وجود فروق معنوية جدية عند المقارنة بالاصحاء.
بينت الدراسة وجود زيادة معنوية في المستديرات ونقصان في طراز العرويات الزندية .كما لوحظ وجود فروق معنوية في متوسطات عدد الخطوط الجلدية للاصابع في كلتا اليدين وكدلك في عدد الخطوط الجلدية بين الاصابع وفي مؤشر كثافة النمط وفي التحليلين الاحادي والثنائي لعدد الخطوط الجلدية .
اكدت هده الدراسة على وجود استعداد وراثي للاصابة بقصر البصر كما اكدت على دور العوامل الوراثية في نشؤ المرض بالاضافة الى العوامل البيئية .وبينت اهمية تحديد الجين او الجينات المسؤولة عنه .

ABSTRACT

Dermatoglyphic analysis of 100 myopia cases and 100 healthy controls from Iraq was studied .The cases diseased series showed morphological differences as compared with controls .The study showed a significant increase in whorl and decrease in ulnar loop patterns .The mean of total ridge counts in digits differ significantly in both hands .A significant differences were observed in the means of interdigital ridge counts and PII.and in the means of unilateral and bilateral analysis .The results of this study affirm the existence of genetic predisposition to myopia and emphasizing the relevance of hereditary factors in the eitopathogenesis of this disease as well as the environmental factors . The discovery of gene or genes responsible of myopia is very important .

INTRODUCTION

Myopia, or nearsightedness, is the single most common human eye disease inthe world Its have a multifactorial disease (1,2) and its genetic basis is well established (3)which is known to have a genetic predisposition (4).

According to epidemiological evidence the prevalence of myopia is increasing especially in Asain populations , its estimated at 70-90% in Asia, 30-40%in Europe and America.and 10-20% in Africa (5).

Myopia is one of the most extensively distributed in Iraqi peoples. It may have some changes in dermatoglyphic traits of the digito –palmar complex ,since the embryogenesis develops.The deratoglyphics can be used to study the participation of genetic factors in many diseases (6) and it has in fact been described as one of the best avaible diagnostic tool in genetic disorders (7).

Dermatoglyphics is a well entity , as markers in single gene disorders , chromosomal abnormality and multifactorial conditions (8). Such conditions include schizophrenia (9) heart disease (10) breast cancer (11)) blood pressure (12) sickle cell anemia (13)and some eye diseases like retinoblastoma (14),cataract (15)strabismus (16) and myopia (17).

Finger patterns in myopia has previously been discussed in few papers,but to my best knowledge this is the first paper about dermatoglyphic patterns of palm in myopia,and it is the first study of this type in Iraq.

MATERRIALS AND METHODS

The paper studied deratoglypgics(finger and palm prints)on 100 myopic females ,and 100 healthy controls,living in Baghdad of Iraq,taken between 2002 and 2009.

The dermatoglyphic analysis (quantitive and qualitative)was made following Cummins and Midlo(18) and Holt(19) .Finger and palm prints were taken by adhesive tap method (20) . Quantitive dermatoglphic patterns comprising of total finger ridge count (TRC),absolute finger ridge count (ARC) and a-b ,b-c ,c-d (fig1),ridge conuts were studied on both hands together and separately .

The results were compared for their differences with a random population control (age ,sex and ethnic matched).No distinction was made between the varieties of whorl (W) patterns (fig. 2a),tend arch was recorded simply as an arch (A) (fig.2b),loop was recorded as either ulnar (**UL**) (**fig.2c**) or radial loop (**RL**) (fig.2d) .

Hands were thoroughly washed with water and soap and dried before taking prints to remove dirt from the hands.

Statistatics

The students t-test and chi-squar were used for the statistatical analysis in this study.As well as relative risk (R.R.) and pattern intensity index (P.I.I.) were studied according A dhiah equation (21) and Cumins and Midlo(18) .

RESULTS AND DISCCUTIONS

The numbers and percentages of digital patterens and total ridge counts of digitals and palms(a-b,b-c,c-d)found in both myopic females and the healthy controls are summerized in tables 1,2,3and4.Table 1 demonstrated the number and percent frequency and means of finger prints in the digits of both hands of patients and controls.The table revealed a significantly high frequency of whorls (39% *vs* 26%) and low frequency of ulnar loops(49% *vs* 58% *)* and in arch (6% *vs* 15%) in myopic patients as compared to controls ($X^2=14.01, p\ 0.05$,df=3*)*.Ulnar loops has the highest percentage in both patients and controls.The same table showed that the whorl has the highest percentage (49%) in the fourth right digit of both groups.

Such increase in whorl patterns has already been reported in some eye diseases like myopia (22),cataract (15)corneal dystrophy (23) and in retinal detachment(24) and in other diseases like rheumatic fever and heart (25).contrary to this result,ulnar loops to be increased in myopic males (26)and chromosomal anomalies (25).It was also been significantly increase in the mean of PII in patients (13.25 *vs* 10.60),this increase due to of higher incidence of the whorls patterns. The same result showed in corneal dystrophy (23) . The value of RR was 2.13 while the value of EF was o.21 . There are also significant differences in the means of unilateral analysisTRC in myopic females in R2 (15.16 *vs* 10.95) ,R3 (14.65 *vs* 19.09),R4(17.72 *vs* 10.05),R5 (15.30 *vs* 9.78),L1(17.23 *vs* 12.90),L2(14.91 *vs* 9.20) and L3(14.08 *vs* 25.18) when the t, test was used between patients and controlst table 3..the same result showed in male astigmatics (26).Table 3 also showed a significant differences in the mean of bilateral analysis ARC in general (21.33 *vs* 13.97) when compared between patients and controls ,as well as all the digitis showed significant differences.Analysis of the palmar ridge counts exhibitated the myopic females have a significant increase in the means particularly in a-b(36.14% *vs* 37.84% *)*and b-c (26.87% *vs* 23.82% *)*in right hand and b-c (27.98% *vs* 25.57%) and c-d (39.04% *vs* 40.05%)in left hand when compared between two groups (t = 4.55, p0.05) table 4.Such increase noticed in a-b and c-d regions of corneal dystrophy (23).

The results of this study mostly affirm the existence of certain genetic component taking place in particular early environmental conditions .

Also these findings point to a specific realationship between frequency of known dermatoglyphic characters in fingers and the genetic predisposition for expression of myopia.

These results may be help us to discriminate mopic patients from phenotypically healthy population in early stages to help them.

The discovery of the specific gene or genes loci responsible for the myopia would be of help to understand eitiopathogenic and the hereditary of this disease .

In general these observation illustrate the strong effect of genetic on myopia as well as the influnces of environmental factors vice versa .

Further studies in this field is worth pursuing to inhance these results .

Conclusion:

The results of this study are highly promising and supportive of genetic etiology in myopia

The dermatoglyphic patterns may be utilized effectively to study the genetic basis of myopia as a marker genetic .

Fig 1 Palm

Fig 2a: whorl

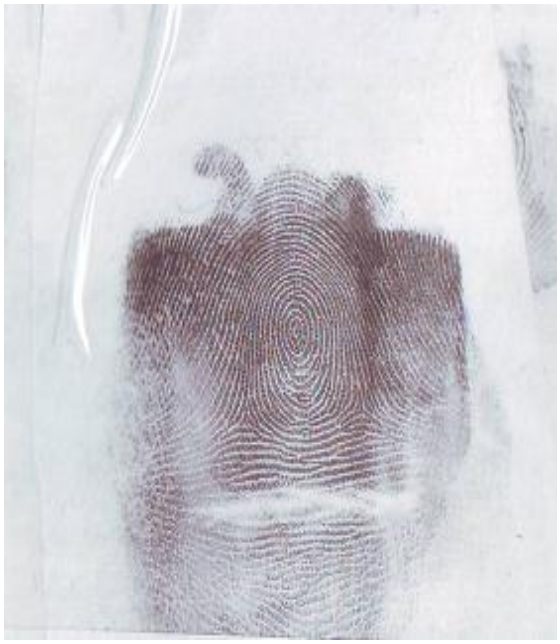

Fig 2b:Ulnar loop

Fig 2c: Radial loop

Fig 2d: Arch

Table1: Number and percent frequency of digital patterns in myopic females and healthy controls

Patterns	myopic females			Healthy controls		
	NO	Maen	±SE	NO	Maen	±SE
W	٣٩٧	0.39	0.3	236	0.26	0.2
LU	٤٩٤	0.49	0.4	580	0.58	٠.٢
LR	٤١	0.05	0.4	٢٤	0.024	0.3
A	٦٨	0.06	0.1	١٦٠	0.15	0.08

X^2 =14.01 P < 0.05 df = 3

Table 2: Number and percent frequencies of digital patterns for each digit of both hands in myopic females and healthy controls.

Pattern	Myopic females										Healthy controls									
	Right hand digit					Left hand digit					Right hand digit					Left hand digit				
	R1 %	R2 %	R3 %	R4 %	R5 %	L1 %	L2 %	L3 %	L4 %	L5 %	R1 %	R2 %	R3 %	R4 %	R5 %	L1 %	L2 %	L3 %	L4 %	L5 %
W	48	39	14*	49	24*	42*	34*	22	48*	21	50	40	24	50	20	40	35	20	48	20
LU	45	39	74	43	65	50	47	62	44	58	43	39	64	42	69	52	46	64	40	50
LR	4	14	10	3	0	6	10	6	4	21	0	13	9	4	4	3	12	10	8	10
A	3	8	2	5	11	2	9	10	4	0	7	8	3	4	7	5	7	6	4	20

Tables 3: Unilateral and Bilateral analysis of digital ridge counts except Arches in myopic females and healthy controls.

Hand	Digit	Myopic females				Healthy controls			
		Unilateral analysis		Bilateral analysis		Unilateral analysis		Bilateral analysis	
		Mean	±SE	Mean	±SE	Mean	±SE	Mean	±SE
Right	R1	18.73	0.54	26.59*	1.18	17.28	0.9	13.93	0.8
	R2	15.16*	0.655	20.70	1.18	10.95	0.52	11.88	0.707
	R3	14.65*	0.66	17.65*	1.075	19.09	1.184	12.23	0.618
	R4	17.72*	0.83	24.89*	1.34	10.05	0,86	15.91	0.75
	R5	15.30*	0.654	18.35*	1.10	9.78	0.75	8.43	0.588
left	L1	17.23*	0.54	23.59*	1.142	12.90	0.9	11.35	1.003
	L2	14.91*	0.716	20.09	1.29	9.20	0.63	9.17	0.785
	L3	14.08*	0.634	18.32*	1.24	25.18	1.212	8.98	0.568
	L4	16.56	0.62	24.19	1.24	32.6	1.676	20.81	0.89
	L5	15.85	0.78	18.93	1.175	21.51	0.909	27.09	1.226

μ= 16.01 **μ=21.33** **μ=16.85** **μ=13.97**

t=1.23, P<0.05 **t=11.02**

Table 4: Means and standard errors of palmar ridge in myopic females and healthy controls.

Hands	Palm	"t"	Myopic females		Healthy controls	
			Mean	±S.E	Mean	±S.E
Right	a-b	12.7*	36.14	0.778	37.84	1.079
	b-c	4.07*	26.87	0.668	23.82	0.491
	c-d	2.65	38.52	0.847	40.98	0.921
left	a-b	1.57	34.82	0.972	33.19	0.68
	b-c	3.3*	27.98	0.662	25.57	0.567
	c-d	4.06*	39.04	0.827	40.05	1.057

"t"=4.55 P<0.05

REFFERENCES

1- Donald,O.,Mutti,E.,Mary,M.,Margaret,C. and Jeffrey,C.(2002).Genetic loci for pathological myopia are not associated with juvenile myopia.American J.of Med.Gen.112:355-360

2-Rose ,K. and Morgan ,I.(2005).How genetic is school myopia .Prog.Retin Eye Res.24(1):1-38

3 -Zhu G., Hewitt, AW., et al.(2008). Genetic dissection of myopia: Evidence for linkage of ocular axial length to chromosome 5q. Ophthalmology. 115:1053-1057

4- Saw, SM. Katz, J. Schein, OD. Chew, SJ. Chan, TK.(1996). Epidemiology of myopia. Epidemiol Rev. 18:175–187

5- Douglas, R. F. (2002). Myopia, BMJ.,18; 324(7347): 1195–1199.

6-Goshim,S.and Fagundes,U. (2004).Dermatoglyphics of children with chronic constipation,Arq Gastroenterol,41,1:37-41

7-Bosco,JI.,Rajangam,S.,Shankar,J. and Thomas,IM. (2001).Dermatoglyphics in 46,XY females.J.Indian Med.Assoc.99(8):418-20

8-Sayee,R.,Roopa,R.,Shubba,R.,Nagesh,H.V. and Job,J. (2008) .Dermatoglyphics-Quantitave analysis in rheumatoid arthritis .Anthropologist,10(3):233-235

9-Bramon,E.,Walshe,M.,McDonald,C. *et.al*.(2005).Dermatoglyphics and schizophrenia:a meta-analysis an investigation of the impact of obstetric complications ridge count.Schizophrenia research ,75(2-3):399-404

10-Takashina,T. and Nakamura,k.(1973).Palmar dermatoglyphics in heart disease.Singapore Med. Jou.,14(3):287-289

11-AL-Estal,M.O.M.(1997).Dermatoglyphic studies of finger tips and palms in patients with breast carcinoma ,M.Sc.thesis Uni.of Baghdad ,Iraq

12-Beliaev,O.V. and Kuznetsova,Z.M.(2006).Complex analysis of risk factors of hypertension in subjects involved in managerial activity.Kardiologiia,46(4):20-23(abstract)

13-Oladipo,G.S.,Olabiyi,O.,Oremosu,A.A.,Noronha,C.C.,Okanlawon,A.O.and Paul,C.U.(2007). Sickle-cell anaemia in Nigeria :dermatoglyphic analysis of 90 cases .African Jou.of Bioch.Res.,1(4):54-59

14-Francois,J.,Matton-Van,M.T.,andDebie,LeuVen,S.,(1969).J.Gent. Human.17:367

15-Angra,S.K.,Rao,N.P.,Panda,A.and Grewal,M.S.(1990).Dermatoglyphic profile in congenital cataracts.Indian J.Pediatr,57(3):429-35

16-Kumudini,M.(1975). A study of genetic factors in strabismus and corneal dystrophy.M.Sc.dissertation,Osmania Uni.,India(cited by Padma,J.S.1980)

17-Chen,C.J.,Cohen,B.H. and Diamond,E.L.(1985).Genetic and environmental effects on the development of myopia in chinese twin children .Ophthalic paediatr genet.,6(1-2):353-9

18-Cummins,H.and Midlo,C.(1943).Finger prints palms and soles,The Blackiston Company,Philadelphia

19-Holt,S.B.,(1973).The significance of dermatoglyphics in medicine.Clinical Pediatrics,12:471-484

20-Purvis-Smith,S.G.(1969).Finger and palm printing technique for the children .Medical J.Austria,2:189

21- A dhiah,A.H.(1990).Immunogenetic studies in selected human diseases.Ph.D.thesis Uni.of Newcastle upon Tyne,U.K.

22-Fincham,J.(2005).The spellbinding power of palmistry ,Green Magic, England

23-Padma,J.S.and Ranga,R.P.(1980).Palmar dermatoglyphics in corneal dystrophy.Indian J. Ophthalmol 28(2):63-66

24-Padma,T.,Murty,J.S. and Satapathy,M. (1980).Dermal ridge configuration in retinal detachment. Acta.Anthropogenet.4 (1-2):41-45

25-Annapurna,V.,Ahja,Y.R.,Reddi,G.D.,Shankar Rao,V. and Niranjan Rao,P.,(1978).Hum.Hered.28,72

26-Chatterjee,S.K. and Mukherji,R. (1991).Genetics of epidermal ridges :a study in subjects with refractive errors.J.Indian,Med.Assoc.89(10):287-289

27-Schauman,B., and Alter,M.(1976).Dermatoglyphics in medical disorders.Springer-Verlag.New York

Recived ……..……. (26/8/2009)
Accepted ……...……... (10/3/2010)