RESEARCH ARTICLE

DETECTING GENETICALLY HIGH RISK INDIVIDUALLY FOR ASTHMA

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ABSTRACT

The dermatoglyphics is an important tool in the diagnosis of several genetic diseases. The present study is related to establish a correlation between dermatoglyphics and asthma. Asthma is a chronic inflammatory disease of the small airways of the lung. Asthma is a complex and heterogenous disease which involves different genetic and environmental factors. The fingerprints of thirty one asthma patients were compared with thirty one control cases. The prints of both hands were taken by rolling finger method with the application of kajal as it is a high source of carbon. In Asthma patients, the percentage of loops was high in all digits except IVth digit with 46.77%. The whorl of only IVth digit (Ring finger) asthma patients was significantly high with 53.22% with respect to control. The arches of I, II, III and Vth digit of patients was high where as the IVth digit shows no significant change. Thus the various dermatoglyphics parameters represent a non-invasive genetic marker help in the early diagnosis of asthma.

INTRODUCTION

Asthma

Asthma is a Greek word that has been derived from the verb 'aazein' which means to exhale with open mouth, to pant. Asthma is a chronic inflammatory disease of the small airways of the lung. It is characterized by the recurrent attacks of paroxysmal dyspnoea which leads to wheezing and shortness of breath. Asthma is a complex and heterogenous disease which involves different genetic and environmental factors. It is classified into two types as Extrinsic and Intrinsic asthma. The extrinsic asthma results from hypersensitivity reactions such as wheal and flare reaction to intradermal allergens where as intrinsic asthma thought to be non-immune and without any atopic background (Platto *et al*., 1973; Daniels *et al*., 1966). Bronchial asthma is one of the most extensively studied respiratory diseases and its genetic basis has been well established. The genetics of asthma susceptibility is mostly studied by Candidate Gene Studies (Daniels *et al*., 1994). The genes are selected on the basis of its function. According to Candidate gene studies 53 genes have been identified and replicated (Mahajan *et al*., 2011; Daniels *et al*., 1966). These genes are involved in different biological processes such as Th2 inflammation, T-reg cell function, HLA locus and IgE response of B cells. There is another method by which signals between asthma and novel genetic marker can be associated which is known as Linkage studies.

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It is based on the disease locus which co-segregates with the disease in families. The 6 novel genes for asthma namely ADAM33, VDR, DPP10, PHF11, HLA-G and GRP154 were indentified in past years (Gupta *et al*., 1993). The first Genome wide association studies of asthma identified ORMDL3 as a novel asthma susceptibility locus on chromosome 17p21 (Mahajan *et al*., 2011; Blumenthal *et al*., 2002). The eQTL (expression quantitative trait locus) for ORMDL3 in lymphoblastoid cell lines (LCLs) indicates that at least one of the SNP (Single nucleotide po) for ORMDL3 in lymphoblastoid cell lines (LCLs) indicates that at least one of the SNP (Single nucleotide polymorphism) regulates the expression of ORMDL3 in a genotype specific manner (Galton *et al*., 1961). Thus the recent advances in molecular method for asthma gene discovery had defined the biological pathway of asthma related susceptibility genes. The studies of asthma gene discovery have evolved over time which had expand our horizon of knowledge and yet more to come in near future.

Dermatoglyphics

Dermatoglyphics has been derived from two greek words 'derma' = skin and 'glyphe'= carving. It is the science and art of the study of surface markings/ patterns of ridges on the skin of the fingers, palm, toes and soles. The scientific study of dermatoglyphics is based upon two major facts; firstly the ridges are slightly different for the fingers and no two individual even the identical twins show exactly similar fingerprint patterns. Secondly the complex pattern of ridges and groves are permanent throughout life as they survive superficial injuries. So, Dermatoglyphics are the reliable source

Table 1. Left hand observation for Asthma Patients and Controls Ridge Counts

		TH	PF	MF	RF	LF
ASTHMA PATIENTS	1	32+27=59	17	16	12+12=24	15+14=29
	2	12+8=20	9+12=21	6	10	14
	3	10	8	10	8	12
	4	0	12	14	15	12
	5	17	0	8	5	8
	6	20+40=60	12	12	12	13
	7	15	15	15	13	11
	8	16	13	13	20	8
	9	28+32=60	17+21=38	14+17=31	20+17=37	18+2=20
	10	16	8	13	14	12
	11	15+8=23	13+8=21	18+13=31	12+13=25	13
	12	12	12	10	10+14=24	9
	13	11	8	12	8	12
	14	15	12	14+21=35	16+24=40	14
	15	20	14+14=28	14+15=29	18+17=35	18
	16	0	5	10	15	4
	17	7	10	8	12	10
	18	0	3+4=7	5+9=14	7+16=23	4+12=16
	19	0	3	12	14	9
	20	14	14	9+8=17	10+11=21	7+10=17
	21	7	12	8	10+8=18	13
	22	8+9=17	7+5=12	12	18	11
	23	16	8	12	14	18
	24	18	11	8	14	15
	25	10+8=18	10+8=18	15	8+20=28	6+14=20
	26	12	2	8	13	4
	27	20	16+15=31	14+12=26	28+16=44	18
	28	10	13	10	19	15
	29	10	20	20+12=32	21+15=36	18
	30	14+18=32	24	15+23=38	15+8=23	10+12=22
	31	32+27=59	17	16	12+12=24	15+14=29
CONTROL	1	14	5	7+1=8	13+3=16	8+4=12
	2	17+11=28	15+12=27	23	12+11=23	19+11=30
	3	15	8+17=25	10	6+7=13	6+19=25
	4	21+7=28	7+10=17	12+15=27	18	15+5=20
	5	6+9=15	8	4+19=23	0	2+21=23
	6	12	12+4=16	9+15=24	7+4=11	13+16=29
	7	9+15=24	12+14=26	18+15=33	9+14=23	7
	8	15+17=32	7+12=19	9	19+17=36	8+16=24
	9	5+18=23	17+11=34	19+12=31	18	16+10=26
	10	7+16=23	5+9=14	11+18=29	18+6=24	8+9=17
	11	17	11+17=28	8+12=20	18+17=35	7+15=22
	12	12+16=28	0	6+8=14	19	11+11=22
	13	17+6=23	18+15=33	12+7=19	15+14=29	12+14=26
	14	10+12=22	19	8+12=20	4+8=12	15
	15	13	12+15=27	16+12=28	12	17+9=26
	16	15+18=33	19+3=22	12+19=31	17+18=35	16+11=27
	17	18+11=29	18	16+12=28	11+16=27	7+15=22
	18	9+12=21	3+8=11	19+17=36	10+14=24	13
	19	6+5=11	5+16=21	14	7+7=14	14+10=24
	20	2+14=16	6+3=9	13+14=27	11+13=24	9+17=26
	21	21+2=23	10	19+4=23	11+17=28	15+18=33
	22	16+12=28	12+8=20	15+16=31	19+13=32	8+6=14
	23	15+12=27	17+11=28	11+18=29	19+12=31	16+5=21
	24	11+14=25	17+14=31	11+12=23	20+13=33	18+13=31
	25	4+13=17	16+17=33	12+9=21	18+17=35	18+6=24
	26	14+11=25	15+15=30	12+17=19	15+8=23	11
	27	19	15+19=34	15+11=26	16+7=23	5+12=17
	28	17+19=36	11+10=21	17+4=21	6+13=19	19+14=33
	29	12+12=24	17+11=28	6+17=23	8+2=10	17+15=32
	30	17+6=23	17	17+12=29	12+14=26	17
	31	11+16=27	10+12=22	11+7=18	12+13=25	2+21=23

TH- Thumb, PF- Pointing finger, MF- Middle finger, RF- Ring finger, LF- Little finger

Table 2. Right hand observation for Asthma Patients and Control's Ridge Counts

		TH	PF	MF	RF	LF
ASTHMA PATIENTS	1	18+16=34	12+12=24	12	15+18=33	14
	2	12+18=30	17+18=35	0	18+12=30	23
	3	21+14=35	16+12=28	14	20+21=41	15+12=27
	4	14	13	12	12+8=20	12
	5	12	3	0		12
	6	30+28=58	14	20	13	18
	7	20	16+22=38	18	18	16
	8	18+18=36	8	10	16+17=33	15
	9	18+20=38	24+20=44	18+12=30	18+18=36	16
	10	18	0	5	14+12=26	12
	11	17+21=38	10+15=25	12+11=23	14	14
	12	17	5	10	12+9=21	5
	13	10	8	9	11	10
	14	20	14	19+14=33	17+14=31	14
	15	16	14+10=24	14+10=24	10+12=22	22+19=41
	16	6	0	10	16+5=21	16+5=21
	17	18+7=25	12+13=25	13	12	0
	18	0	0	4	9	6
	19	22	8	9	13	10
	20	15+10=25	0	12	10+14=24	14
	21	12	14	9	21	8+4=12
	22	13	8	13	16	13
	23	8	12	4	3	10+6=16
	24	24	18	15	4+13=17	12
	25	18+15=33	18+15=33	16	25+12=37	12+8=20
	26	17	3	7	5	2
	27	14	13+10=23	20+16=36	14+18=32	12
	28	18	12	8	18	8
	29	20	18+18=36	18	22+12=34	14
	30	19+12=31	21+23=44	20	20+12=32	16+8=24
	31	18+16=34	12+12=24	12	15+18=33	14
CONTROL	1	12	12	7	13	8
	2	7+11=18	5+12=17	13	12	9+11=20
	3	5+15=20	7+8=15	10	9	12+8=20
	4	21	7+11=18	17	11	12+6=18
	5	12+6=18	10	11	10	8+16=24
	6	8+7=15	11	2	5+17=22	12+12=24
	7	6+9=15	12	8	12+8=20	12+17=29
	8	13	18+15=33	14	13+10=23	15+18=33
	9	0	18+16=34	12	8	8+4=12
	10	8	9	12+6=18	12+8=20	9+10=19
	11	7	7+12=19	12+8=20	10+14=24	9+17=26
	12	12	15+10=25	10+8=18	18	17
	13	12+8=20	0	12+8=20	14+16=30	16+12=28
	14	8	5+6=11	7+11=18	5	8+12=20
	15	9+12=21	14+16=30	12+8=20	11+11=22	11+5=16
	16	8	7+12=19	11+16=27	17	18+6=24
	17	11+13=24	12+14=26	12+16=28	19+16=35	15+14=29
	18	9+12=21	8+13=21	12+7=19	8	16+14=30
	19	8	0	12	18+15=33	16+12=28
	20	9+17=26	18+16=34	1`7	15	12+18=30
	21	8+11=19	11+18=29	15+16=31	12+13=25	19+18=37
	22	7	0	15+12=27	19	17
	23	12	18	16	12+6=18	12
	24	17+16=33	15	16+17=33	12	15+6=21
	25	17+12=29	11	9+17=26	6+8=14	17+12=29
	26	18	15	16+17=33	16	19+8=27
	27	17+12=29	15	12+8=20	11+11=22	12+9=21
	28	17+18=35	11	9+8=17	6+13=19	19+17=36
	29	18	17+6=23	16+15=31	17	19+18=37
	30	17+16=33	16+17=33	18+7=25	12	17+12=29
	31	11+6=17	10+12=22	18	12+14=26	13+16=29

of information due to its uniqueness and permanence features. The fingerprints have general ridges patterns which are grouped as loops, whorls and arches. The dermal ridges differentiation takes place early in the foetal development which is established in the third month of gestation period approximately from 4th to 10th week of gestation (Gupta *et al*., 2003). Thus the genetic make up and environmental factors are responsible to affect the total finger ridge number.

Dermatoglyphics patterns have polygenic inheritance and it is a diagnostic tool for understanding the genetics of many diseases such as Down's syndrome, Kilnfelter's syndrome as well as in several chronic diseases like Diabetes Mellitus, Lung Tuberculosis and bronchial asthma (Holt *et al*., 1961; Platto *et al*., 1973).

Table 3. Analysis of Right hand Finger Prints for Asthma Patients and Control

		TC	PC	DC	a	b	c	d	t	atd	TH	PF	MF	RF	LF
ASTHMA PATIENTS	1	V	V	V	N	N	V	V	V		UL	RL	UL	UL	UL
	2	N	N	V	N	N	N	N	V		DLW	DLW	SA	DLW	UL
	3	V	V	V	N	N	N	N	N	34°	SLW	SLW	UL	DLW	SLW
	4	N	V	V	N	N	N	N	N	32°	UL	UL	UL	SLW	UL
	5	V	V	V	N	N	N	N	N	42°	UL	UL	SA	UL	UL
	6	N	V	V	N	N	N	N	N	42°	DLW	RL	UL	UL	UL
	7	N	V	N	N	N	N	N	N	39°	UL	CPW	UL	UL	UL
	8	N	V	V	N	N	N	N	N	34°	SLW	UL	UL	SLW	UL
	9	N	V	N	N	N	N	N	V		CPW	SLW	DLW	CPW	CPW
	10	N	V	V	N	N	N	N	N	34°	UL	SA	UL	DLW	UL
	11	N	N	V	N	N	N	N	N	40°	SLW	DLW	SLW	DLW	UL
	12	N	V	N	N	N	N	N	N	46°	UL	CPW	UL	SLW	UL
	13	N	V	V	N	N	N	N	V		UL	UL	UL	UL	UL
	14	V	N	V	N	N	N	N	N	39°	UL	RL	CPW	SLW	UL
	15	N	V	V	N	N	N	N	N	33°	DLW	DLW	SLW	SLW	UL
	16	N	N	V	N	N	N	N	N	41°	SA	UL	UL	UL	SA
	17	N	V	N	N	N	N	N	N	36°	SA	DLW	SLW	SLW	SLW
	18	V	V	V	N	N	N	N	N	36°	SA	SA	UL	SLW	SLW
	19	V	V	V	N	N	N	N	N	42°	UL	UL	UL	UL	UL
	20	N	V	V	N	N	N	N	N	41°	DLW	TA	UL	CPW	UL
	21	V	V	N	N	N	N	N	V		UL	UL	MUL	UL	DLW
	22	V	V	N	N	N	N	N	V		DLW	DLW	MUL	UL	UL
	23	V	V	V	N	N	N	N	N	33°	DLW	UL	UL	UL	UL
	24	V	V	V	N	N	N	N	N	33°	UL	RL	UL	SLW	UL
	25	N	N	V	N	N	N	N	N	30°	DLW	DLW	UL	SLW	DLW
	26	V	N	V	N	N	N	N	N	32°	UL	UL	UL	UL	UL
	27	V	V	V	N	V	N	N	N	34°	UL	DLW	DLW	DLW	CPW
	28	V	V	N	N	V	N	N	N	35°	UL	UL	UL	SLW	UL
	29	V	N	V	N	N	N	N	N	41°	UL	SLW	UL	SLW	UL
	30	N	V	V	N	N	N	N	N	39°	SLW	CPW	UL	SLW	SLW
	31	N	V	V	N	N	N	N	N	36°	SLW	DLW	UL	SLW	UL
CONTROL	1	N	N	V	N	N	N	N	N	40	UL	UL	UL	UL	UL
	2	N	N	V	N	N	N	N	N	42	SLW	SLW	UL	UL	SLW
	3	N	V	N	N	N	N	N	N	41	SLW	SLW	UL	UL	SLW
	4	N	N	N	N	N	N	N	N	43	UL	CPW	UL	UL	SLW
	5	N	N	N	N	N	N	N	N	40	CPW	UL	UL	UL	SLW
	6	N	N	N	N	N	N	N	N	41	CPW	UL	RL	SLW	DLW
	7	N	V	N	N	N	N	N	N	42	CPW	UL	UL	SLW	CPW
	8	N	V	N	N	N	N	N	N	42	UL	DLW	UL	SLW	CPW
	9	N	N	N	N	N	N	N	N	40	SA	DLW	UL	UL	DLW
	10	N	N	V	N	N	N	N	N	43	UL	UL	SLW	DLW	SLW
	11	N	N	N	N	N	N	N	N	41	UL	SLW	SLW	DLW	SLW
	12	V	N	N	N	N	N	N	N	41	UL	SLW	SLW	UL	UL
	13	V	N	V	N	N	N	N	N	42	DLW	SA	SLW	DLW	SLW
	14	V	N	V	N	N	N	N	N	0	UL	DLW	SLW	UL	CPW
	15	N	N	N	N	N	N	N	N	42	DLW	DLW	CPW	CPW	SLW
	16	N	N	N	N	N	N	N	N	40	UL	DLW	DLW	UL	DLW
	17	N	N	N	N	N	N	N	N	43	CPW	SLW	DLW	CPW	DLW
	18	N	V	N	N	N	N	N	N	42	CPW	CPW	DLW	UL	SLW
	19	V	N	N	N	N	N	N	N	40	RL	SA	CPW	SLW	CPW
	20	N	N	N	N	N	N	N	N	42	SLW	CPW	UL	UL	CPW
	21	N	V	N	N	N	N	N	N	41	SLW	SLW	CPW	CPW	SLW
	22	N	N	N	N	N	N	N	N	40	RL	SA	SLW	UL	UL
	23	V	N	N	N	N	N	N	N	0	UL	UL	UL	DLW	UL
	24	V	N	N	N	N	N	N	N	42	CPW	UL	DLW	UL	SLW
	25	N	V	N	N	N	N	N	N	43	CPW	UL	SLW	DLW	SLW
	26	N	N	N	N	N	N	N	N	40	UL	UL	SLW	UL	SLW
	27	V	N	V	N	N	N	N	N	43	SLW	UL	CPW	DLW	DLW
	28	N	N	N	N	N	N	N	N	42	SLW	UL	CPW	SLW	DLW
	29	N	N	N	N	N	N	N	N	40	UL	CPW	SLW	UL	SLW
	30	N	V	V	N	N	N	N	N	40	SLW	SLW	SLW	UL	SLW
	31	N	V	V	N	N	N	N	N	41	SLW	DLW	UL	DLW	SLW

Dermatoglyphics in Asthma

Since atopic asthma is a genetically transmitted disease but several studies had identified that there is some correlation between asthma and dermatoglyphics. Thus the fingerprints represent a non-invasive genetic marker in early detection of bronchial asthma and its treatment. The present study is based on dermatoglyphics changes with respect to asthma patients.

Table 4. Analysis of Right hand Finger Prints for Asthma Patients and Control

		TC	PC	DC	a	b	c	d	t	atd	TH	PF	MF	RF	LF
ASTHMA PATIENTS	1	V	V	V	N	N	N	N	N	39°	UL	UL	UL	UL	UL
	2	V	V	V	N	N	N	N	N	45°	DLW	SLW	UL	UL	UL
	3	V	V	V	N	N	N	N	abs		DLW	UL	SLW	SLW	UL
	4	N	N	V	N	N	N	N	N	35°	UL	UL	UL	UL	UL
	5	N	V	V	N	N	N	N	N	38°	UL	SA	UL	UL	UL
	6	V	V	V	N	N	N	N	N	45°	DLW	RL	UL	UL	UL
	7	N	V	V	N	N	N	N	N	39°	UL	RL	UL	UL	UL
	8	N	V	N	N	N	N	N	N	35°	UL	UL	UL	UL	UL
	9	N	N	N	N	N	N	N	N	32°	SLW	CPW	DLW	SLW	UL
	10	N	V	N	N	N	N	N	N	32°	UL	UL	UL	UL	UL
	11	N	N	V	N	N	N	N	abs		SLW	DLW	DLW	UL	UL
	12	N	V	V	N	N	N	N	N	52°	UL	UL	UL	SLW	UL
	13	V	V	V	N	N	N	N	N	32°	UL	UL	UL	SLW	UL
	14	N	V	V	N	N	N	N	N	35°	UL	UL	DLW	DLW	UL
	15	N	N	N	N	N	N	N	N	32°	UL	DLW	UL	UL	SLW
	16	N	N	N	N	N	N	N	N	42°	RL	SA	UL	SLW	SLW
	17	V	N	N	N	N	N	N	N	45°	DLW	DLW	UL	DLW	UL
	18	V	V	V	N	N	N	N	N	38°	DLW	SLW	UL	UL	UL
	19	V	V	V	N	N	N	N	N	43°	UL	UL	UL	UL	UL
	20	N	V	V	N	N	N	N	N	40°	UL	UL	SLW	SLW	DLW
	21	V	V	V	N	N	N	N	N	34°	UL	UL	UL	SLW	UL
	22	N	N	N	N	N	N	N	abs		DLW	DLW	UL	UL	UL
	23	N	V	V	N	N	N	N	N	32°	UL	UL	UL	SLW	UL
	24	V	V	V	N	N	N	N	N	39°	UL	UL	RL	UL	UL
	25	N	V	V	N	N	N	N	N	38°	DLW	DLW	DLW	SLW	DLW
	26	N	V	V	N	N	N	N	abs		UL	UL	UL	UL	UL
	27	V	V	V	N	N	N	N	N	43°	UL	DLW	DLW	CPW	UL
	28	N	V	V	N	N	N	N	N	35°	UL	UL	UL	UL	UL
	29	N	V	V	N	N	N	N	N	49°	SLW	SLW	SLW	SLW	UL
	30	N	N	N	N	N	N	N	N	42°	CPW	UL	DLW	SLW	SLW
	31	N	V	V	N	N	N	N	N	42°	SLW	RL	UL	RL	DLW
CONTROL	1	V	V	N	N	N	N	N	abs		UL	SLW	UL	UL	DLW
	2	N	V	N	N	N	N	N	N	42	UL	SLW	SLW	UL	SLW
	3	N	V	N	N	N	N	N	N	41	SLW	UL	SLW	UL	DLW
	4	V	V	N	N	N	N	N	N	40	SLW	CPW	SLW	UL	SLW
	5	V	N	N	N	N	N	N	N	43	CPW	UL	DLW	UL	CPW
	6	V	N	V	N	N	N	N	N	41	DLW	SLW	DLW	CPW	SLW
	7	N	N	N	N	N	N	N	N	42	UL	UL	SLW	DLW	RL
	8	V	N	N	N	N	N	N	abs		SLW	CPW	UL	SLW	SLW
	9	V	V	V	N	N	N	N	N	42	SA	SLW	DLW	DLW	UL
	10	V	V	N	N	N	N	N	N	42	UL	DLW	CPW	SLW	CPW
	11	V	N	N	N	N	N	N	N	41	SLW	DLW	DLW	UL	UL
	12	N	N	N	N	N	N	N	N	40	DLW	SLW	SLW	CPW	DLW
	13	V	V	V	N	N	N	N	N	43	DLW	CPW	SLW	DLW	UL
	14	N	V	V	N	N	N	N	abs		UL	SLW	SLW	DLW	CPW
	15	V	N	N	N	N	N	N	N	41	SLW	CPW	DLW	UL	CPW
	16	N	N	N	N	N	N	N	N	42	DLW	UL	SLW	DLW	SLW
	17	V	V	N	N	N	N	N	N	43	UL	UL	CPW	SLW	UL
	18	V	V	N	N	N	N	N	N	41	CPW	SLW	DLW	UL	DLW
	19	N	N	N	N	N	N	N	N	40	RL	SA	CPW	RL	UL
	20	V	V	N	N	N	N	N	N	41	SLW	CPW	UL	DLW	SLW
	21	V	V	N	N	N	N	N	N	42	SLW	UL	DLW	UL	SLW
	22	V	V	N	N	N	N	N	N	43	DLW	DLW	SLW	CPW	DLW
	23	V	V	V	N	N	N	N	abs		SLW	CPW	SLW	DLW	UL
	24	V	V	N	N	N	N	N	N	43	UL	UL	DLW	DLW	SLW
	25	N	N	V	N	N	N	N	N	40	DLW	SLW	CPW	UL	SLW
	26	V	V	N	N	N	N	N	N	42	SLW	DLW	UL	UL	RL
	27	V	N	N	N	N	N	N	abs		DLW	UL	SLW	UL	DLW
	28	N	V	N	N	N	N	N	N	41	DLW	UL	SLW	CPW	DLW
	29	N	N	N	N	N	N	N	N	40	UL	DLW	CPW	SLW	SLW
	30	V	N	N	N	N	N	N	abs		SLW	CPW	UL	DLW	SLW
	31	N	N	N	N	N	N	N	N	43	UL	UL	SLW	UL	SLW

MATERIALS AND METHODS

The study was conducted on 31 asthma patients and compared with 31 controls. The materials required for taking the prints was kajal, A4 size data sheet, magnifying glass, pencil, scale and tissue paper. The fingerprints were taken by rolling finger method. The subjects were instructed to thoroughly wash their hands with soap. The kajal was applied to palm and tips of the

Table 5. Distribution of Figertip patterns in Asthma patients and Control

Digit		Control			Asthma patients		
		Total (Rt31+Lt31)= 62			Total (Rt31+Lt31)= 62		
		Loop	Whorl	Arch	Loop	Whorl	Arch
I	Rt.	13	17	1	15	13	3
	Lt.	10	20	1	19	12	0
	Total	23	37	2	34	25	3
II	Rt.	11	17	3	14	14	3
	Lt.	10	20	1	19	10	2
	Total	21	37	4	33	24	5
III	Rt.	12	19	0	23	6	2
	Lt.	5	26	0	22	9	0
	Total	17	45	0	45	15	2
IV	Rt.	16	15	0	11	20	0
	Lt.	14	17	0	18	13	0
	Total	30	32	0	29	33	0
V	Rt.	4	27	0	22	8	1
	Lt.	8	23	0	25	6	0
	Total	12	50	0	47	14	1
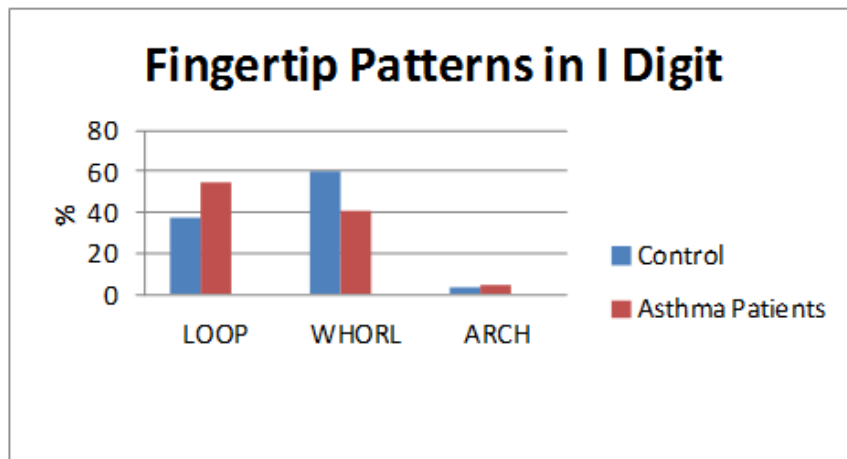
Fig. 1. Distribution of Fingertip patterns in I digit
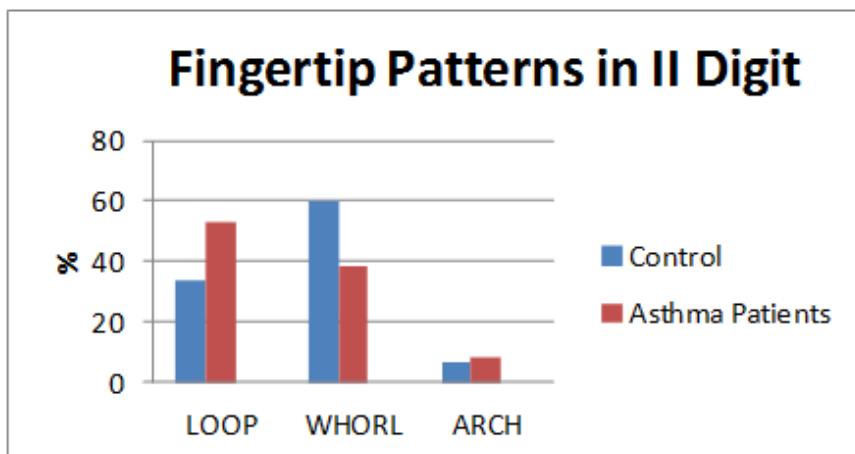
Fig. 2. Distribution of Fingertip patterns in II digit
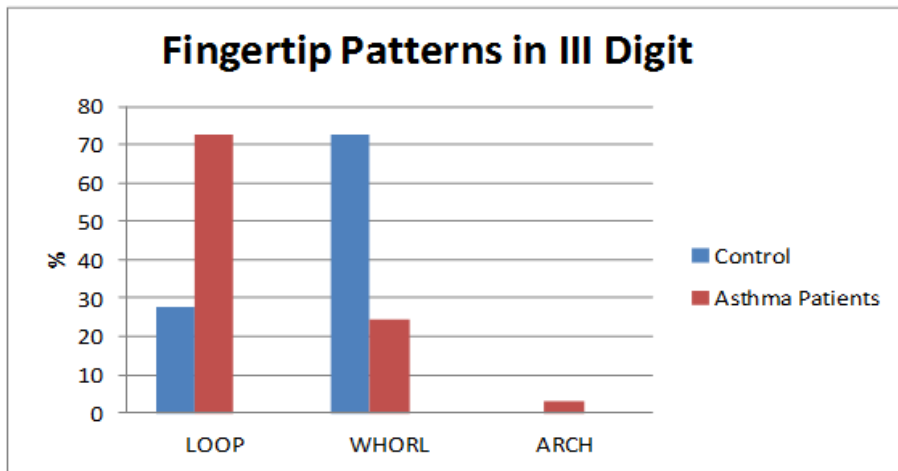
Fig 3. Distribution of Fingertip patterns in III digit
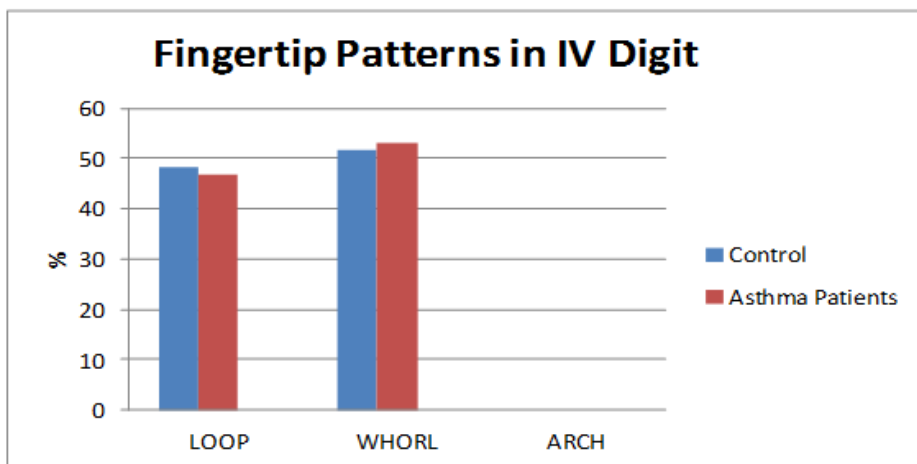
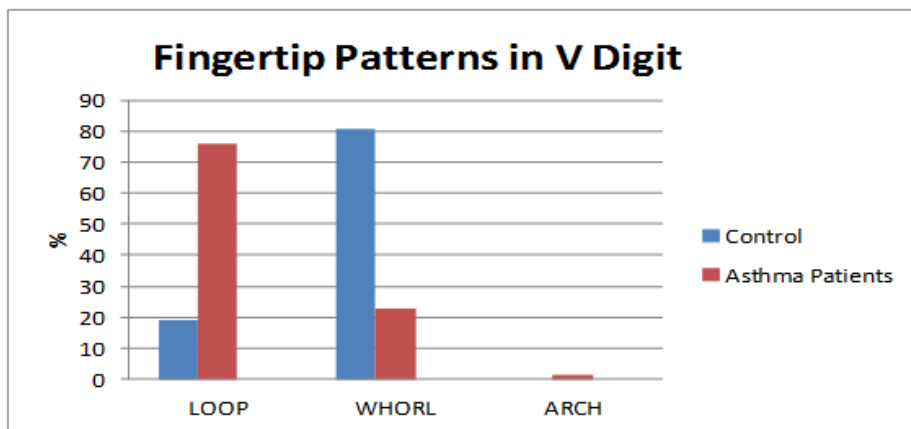**Fig. 4. Distribution of Fingertip patterns in IV digit**

Fig. 5. Distribution of Fingertip patterns in V digit

fingers and then pressed and rolled against paper. The patterns which were studied and analyzed are simple arch(SA), ulnar loop(UL), modified ulnar loop(MUL), radial loops(RL), single loop whorl(SLW), double loop whorl(DLW), central pocket whorl(CPW) as well as variation in thenar crease(TC), proximal crase(PC) and distal crease(DC).

RESULTS AND DISCUSSION

In Asthma patients, the percentage of loops was high in all digits except IVth digit with 46.77% (Fig.4). The whorl of only IVth digit (Ring finger) asthma patients was significantly high with 53.22% with respect to control. The arches of I, II, III and

Vth digit of patients was high where as the IVth digit shows no significant change (Table 5).

Conclusion

The present study is based on various dermatoglyphics parameters which help in the early diagnosis of asthma. The prints represent as a non- invasive marker for the detection of asthma.

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