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Relationship between Dermatoglyphic Patterns and Academic Performance among Students of Madonna University, Nigeria

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Abstract

This study aimed at establishing the relationship between dermatoglyphic patterns and academic performance of students in Madonna University. A total of 200 students voluntarily participated in this study which was selected randomly. Validated questionnaire was distributed to the students, and their right and left hand fingerprints were collected simultaneously using digital scanning method. The data were tested using mood median test, Pearson Chisquare analysis of association and fitness regression model. The mood's median test of the result showed that the differences in the median score for the different patterns and academic patterns were not significant for the entire right digit ($p>0.05$) while for the left, all the digits were not showing differences in the patterns and academic performance except the left index digit ($p<0.05$). Also, the test of association between finger patterns and academic performance was observed to be significant only in the right little finger while the left fingers showed no significant association between the variables. The study also showed no significant difference between ATD angle and academic performance of Madonna University students as Regression Model (R-square value) at zero indicate no accuracy in the prediction ($P>0.05$). In conclusion this study has shown that there is significant association between finger patterns (especially right little finger and left index finger) and academic performance. However, ATD angle on the other hand did not show any significant difference with academic performance among the students. This implies that while finger patterns may be used to predict academic performance, ATD angle on the other hand may not serve a better tool in predicting academic performance among Madonna University students.

Keywords: Dermatoglyphics, Fingerprint Pattern, ATD angle, Academic Performance.

INTRODUCTION

Dermatoglyphics is the study of epidermal ridges found on the surfaces of the palm and sole. These patterns and ridges do not change through the entire life of a person and thus are unique features of the identification of an individual (Kriti *et al.,* 2022; Sandeep *et al.,* 2012; Jeewandeep & Arvinder, 2013). Dermatoglyphics is a derivative of two words 'derma' which refers to 'skin' and 'glyphe' which refers to 'curves' (Cummins & Midlow, 1961). These dermal ridges are determined genetically by the interaction of several genes (Bhat *et al.,* 2014), and thus, they are a characteristics feature of a person which differs from one person to another (Pratibha *et al.,* 2011; Oladipo *et al.,* 2013). It is basically classified as loops, whorls, and arches according Galton (1892). Researchers have shown that Dermatoglyphic patterns are not influenced significantly after birth by environmental factors (Naffah, 1977). The pattern of dermatoglyphics are analysed in several ways such as Finger print analysis (e.g. arches, loops and whorls), Finger ridge counts, Position of the axial triradii 'ATD' angle, number of palmar triradii, a-b ridge count, etc. (Schaumann & Alter, 1976; Chimne and Ksheersagar, 2012). Scientific studies suggest that the palm and fingerprints are closely associated with brain functions since the development of dermatoglyphical markings of the hand occur at the same period the brain develops from embryonic ectoderm (Mollic & Habib, 2011; Hirsch & Schweighel, 1973). As a result a number of genetic diseases have left marks on both the brain and the hand, (Walker, 1977; Lainhart*et al.,* 1997; Bulagouda *et al.,* 2013; Osaat, 2025).

The academic performance of a student is as a result of the student's cognitive (learning) ability (Rohde

& Thompson, 2007; Leeson *et al.,* 2008). Cognitive abilities such as memory, speech and auditory capabilities are functions of the cerebral cortex of the brain. The academic performance also indicates the level of reasoning and understanding of the individual. Therefore qualitative and quantitative assessment of the academic performance of students would directly reflect on the students intellectual brain function. Students' academic performance at all levels of education shows stratifications (Etsey, 2005; Mlambo, 2012). Some students perform well while others not so good; some very poorly. In the literature review, we discovered that studies supporting this hypothesis in Nigeria are minimal; there are no much studies which utilize the relationship of various patterns of thumbprint and academic performance of students, thus, the present study was conducted to provide background knowledge on the relationship between dermatoglyphics and academic performance of students in Madonna University.

MATERIALS AND METHOD

Research Design

This is study employs a correlational survey design. A total of 200 (males 100 and females 100) undergraduate students participated in this study, 100 Pharmacy students and 100 Medical Laboratory Science students. The participants were recruited through proportionate stratified random sampling from the department of Pharmacy and Medical Laboratory Science, Madonna University, Nigeria. Those who fulfilled the inclusion and exclusion criteria and ranges between the ages of 18-25 were included. Participants with any physical disability or finger or palm deformity/injury, and non-students of Madonna University were excluded. Each participant volunteered to join in the study by signing a consent form prior to the start of the study. The aim and procedure of this study were explained in detail to the participants. The study was approved by the ethical committee of the Madonna University, Nigeria.

Method of Data Collection and determination

The dermatolyphic patterns were collected and determined using a scanning according to Oghenemavwe & Osaat, 2015. The palms of each participant were clean-dried thoroughly and placed gently on the scanner with all five fingers apart and touching the surface of the scanner, and electric power was switched on to power the computer and the scanner. The palms/fingers of the students where scanned and saved appropriately into a folder. The subject data was taken on a plain A4 sheet of paper; using alphabets (M for Males and F for females) in place of the subject's name female in accordance with their respective serial number.

Finger Print Patterns was classified into Arch (A), Ulnar loop (UL), Radial loop (RL) and Whorl (W). ATD angle were measured using AUTOCAD Program after a line drawn between two tri-radii. "ATD" angle is measured between 'a', 't' and 'd' tri-radii points for both hands.

The average scores for two consecutive semesters examination results as obtained from the exam officers of the two departments was calculated for each student and stratified into two: ≥60 (↑A; Above average) and ≤59 (A; Average).

Method of Data analysis

The relationship between a student's academic score and dermatoglophic patterns were explored using SPSS software (version 20). Mood's Median test was used to determine whether the medians scores from the courses differ across the fingerprint patterns (with the assumption of unpredictable dissimilar distribution). Pearson's Chi-square analysis of association was use to evaluate the association between fingerprint pattern and the grade of the score. Fit Regression Model was used to model the relationship between the ATD angle of both hands and the average score.

RESULTS

The different fingerprint patterns for the both right and left hands observed in this study are recorded in tables below.The mood's median test and the result showed that the differences in the median score for the different patterns were not significant for all the right digit; I ($\chi^2_{[df=3]}$ =1.73; P=0.631), II ($\chi^2_{[df=3]}$ =2.31; P=0.510), III ($\chi^2_{[df=3]}$=2.57; P=0.460), IV ($\chi^2_{[df=3]}$=1.13; P=0.769), and V ($\chi^2_{[df=3]}$ =1.13; P=0.769) (Table 1a), while for the left, all digit except the index (II; $\chi^2_{[df=3]}$ =9.47; P=0.024) was significant, other fingers did not have significant different median score; I ($\chi^2_{[df=3]}$=1.75; P=0.626), III ($\chi^2_{[df=3]}$=0.17; P=0.983), IV ($\chi^2_{[df=3]}$=5.41; P=0.144), and V ($\chi^2_{[df=3]}$=1.18; P=0.759) (Table 1b).

Table 1a: The distribution and Mood's median test of difference in average score with respect to the right fingerprint pattern

Finger (Right)	Pattern	Median	N ≤ Overall Median	N > Overall Median	DF	Chi-square	P-value
Thumb (I)	**A**	59.5	20	14	3	1.73	0.631
	RL	61.25	2	2			
	UL	61.25	54	54			
	W	61.67	24	30			
	Overall	**61.25**					
Index (II)	**A**	61.17	25	23	3	2.31	0.510
	RL	62.33	9	16			

Finger (Right)	Pattern	Median	N ≤ Overall Median	N > Overall Median	DF	Chi-square	P-value
	UL	61.00	49	44			
	W	61.08	17	17			
	Overall	**61.25**					
Middle (III)	**A**	60.25	18	14	3	2.57	0.462
	RL	58.92	7	5			
	UL	61.67	56	67			
	W	59.50	19	14			
	Overall	**61.25**					
Ring (IV)	**A**	59.67	13	10	3	1.13	0.769
	RL	59.17	5	3			
	UL	61.42	62	64			
	W	61.33	20	23			
	Overall	**61.25**					
Little (V)	**A**	57.50	14	5	3	7.09	0.069
	RL	58.83	4	2			
	UL	61.67	68	83			
	W	58.75	14	10			
	Overall	**61.25**					

Note: A=Arch, RL=Radial Loop, UL=Ulnar Loop, W=Whorl

Table 1b: The distribution and Mood's median test of difference in average score with respect to the left fingerprint pattern

Finger (Left)	Pattern	Median	N ≤ Overall Median	N > Overall Median	DF	Chi-square	P-value
Thumb (I)	**A**	62.00	17	17	3	1.75	0.626
	RL	58.58	8	4			
	UL	61.50	55	61			
	W	60.92	20	18			
	Overall	**61.25**					
Index (II)	**A**	61.00	19	16	3	9.47	0.024*
	RL	62.17	17	22			
	UL	59.83	49	32			
	W	63.00	15	30			
	Overall	**61.25**					
Middle (III)	**A**	60.00	10	9	3	0.17	0.983
	RL	62.33	7	8			
	UL	61.33	70	71			
	W	60.33	13	12			
	Overall	**61.25**					
Ring (IV)	**A**	58.00	12	5	3	5.41	0.144
	RL	60.17	9	6			
	UL	61.75	58	72			
	W	60.42	21	17			
	Overall	**61.25**					
Little (V)	**A**	59.67	10	7	3	1.18	0.759
	RL	60.17	3	2			
	UL	61.42	77	83			
	W	58.25	10	8			
	Overall	**61.25**					

Note: A=Arch, RL=Radial Loop, UL=Ulnar Loop, W=Whorl

Table 2a, 2b, 2c, 2d, 2e showed the right hand pattern for the test of association between academic performance and dermatoglyphics and table 3a, 3b, 3c, 3d, and 3e showed the left hand patterns for the test of association between academic performance and dermatoglyphics. Amongst all, the right little finger patterns (table 2e) showed a significant association between academic performance and dermatoglyphic pattern ($p<0.05$).

Table 2a: Right thumb patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	17	3	66	35	2.358	3	0.501
	14.05	2.48	54.55	28.93			
A (%)	17	1	42	19			
	21.52	1.27	53.16	24.05			
All (%)	34	4	108	54			
	17	2	54	27			

Table 2b: Right index finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	29	19	53	20	3.033	3	0.387
	23.97	15.7	43.8	16.53			
A (%)	19	6	40	14			
	24.05	7.59	50.63	17.72			
All (%)	48	25	93	34			
	24	12.5	46.5	17			

Table 2c: Right middle finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	17	6	81	17	3.872	3	0.276
	14.05	4.96	66.94	14.05			
A (%)	15	6	42	16			
	18.99	7.59	53.16	20.25			
All (%)	32	12	123	33			
	16	6	61.5	16.5			

Table 2d: Right ring finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	12	4	76	29	1.905	3	0.592
	9.92	3.31	62.81	23.97			
A (%)	11	4	50	14			
	13.92	5.06	63.29	17.72			
All (%)	23	8	126	43			
	11.5	4	63	21.5			

Table 2e: Right little finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	7	3	100	11	8.958	3	0.03*
	5.79	2.48	82.64	9.09			
A (%)	12	3	51	13			
	15.19	3.8	64.56	16.46			
All (%)	19	6	151	24			
	9.5	3	75.5	12			

Table 3a: Left thumb patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	20	4	74	23	4.272	3	0.234
	16.53	3.31	61.16	19.01			
A (%)	14	8	42	15			
	17.72	10.13	53.16	18.99			
All (%)	34	12	116	38			
	17	6	58	19			

Table 3b: Left index finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	22	26	41	32	6.133	3	0.105
	18.18	21.49	33.88	26.45			
A (%)	13	13	40	13			
	16.46	16.46	50.63	16.46			
All (%)	35	39	81	45			
	17.5	19.5	40.5	22.5			

Table 3c: Left middle finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	10	9	88	14	0.921	3	0.820
	8.26	7.44	72.73	11.57			
A (%)	9	6	53	11			
	11.39	7.59	67.09	13.92			
All (%)	19	15	141	25			
	9.5	7.5	70.5	12.5			

Table 3d: Left ring finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	6	8	86	21	7.017	3	0.071
	4.96	6.61	71.07	17.36			
A (%)	11	7	44	17			
	13.92	8.86	55.7	21.52			
All (%)	17	15	130	38			
	8.5	7.5	65	19			

Table 3e: Left little finger patterns, grade distribution and test of association

	A	RL	UL	W	Chi-Square	DF	P-Value
↑A (%)	9	3	101	8	2.81	3	0.422
	7.44	2.48	83.47	6.61			
A (%)	8	2	59	10			
	10.13	2.53	74.68	12.66			
All (%)	17	5	160	18			
	8.5	2.5	80	9			

Table 4a showed the regression model summary used to test for accuracy of ATD angle of right and left hands. R-square value at zero indicates no accuracy in the prediction of academic performance and ATD angle. The change in the average score of the students is independent of the `ATD` angle changes. There is no significant difference between academic performance and ATD angle of Madonna students (P>0.05). It also shows that whatever changes observed could possibly be due to chance. Table 4b showed no significantly difference in the prediction of academic performance and ATD angle.

Table 4a: The regression model summary (accuracy)

Variable	S	R-sq	R-sq(adj)
RATD	5.75546	0.02%	0.00%
LATD	5.75034	0.20%	0.00%

Table 4b: Analysis of variance for testing significance of prediction

Variable	Source	DF	SS	MS	F	P	Inf.
RATD	Regression	1	1.57	1.5716	0.05	0.828	NS
	Error	198	6558.81	33.1253			
	Total	199	6560.38				
LATD	Regression	1	13.24	13.2388	0.40	0.528	NS
	Error	198	6547.15	33.0664			
	Total	199	6560.38				

DISCUSSION

In the recent years, Researches on dermatoglyphic patterns have been trending in anthropometric studies. Dermatoglyphics analyses are useful in biometrics based electronic gadgets, education, enterprise, investigation of criminal cases, personal growth, and recognition of unidentified corpses. ATD angle has been in use for selecting many athletes in China, Taiwan, Malaysia, Japan, Russia, etc. Less than 35° ATD angle predicts the potential of a person as a born Athletes, Sharp Observer, and agile task performer. An angle of more than 46° and above considered being a slow learner (Abhimanyu *et al.,* 2016). Dermatogiyphics multi-intelligence test (DMIT) identifies children/students inborn talents and weakness, educational stream selection, and helps in discovering one`s own abilities and choosing a right career path (Anu *et al.,* 2022). Emotional quotient, the intelligent quotient, adversity quotient, creativity quotient can also be assessed. Dermatogiyphics multi-intelligence test (DMIT) also helps in identifying the suitable learning and leadership styles (Abhimanyu *et al.,* 2016). At many places it is used for pre-employment screening. This study was done to establish the relationship between dermatoglyphic patterns and academic Performance of Madonna University students. The academic performance of a student is a product of the student's cognitive (learning) ability which includes memory, speech and auditory capabilities that are functions of the cerebral cortex of the brain. The academic performance also indicates the level of reasoning and understanding of the individual. The fact is that the individual's brain (intellect) has genetic dispensation, likewise his/her palm and finger dermatoglyphic pattern (Schaumann & Alter, 1976). The brain and epidermal ridge patterns on fingers (fingerprints) and palms (palmprints) develop at the same period from embryonic ectoderm (Anu *et al.,* 2022). However, from the present study, the mood's median test showed that the differences in the median score for the different finger patterns were not significant on the right hand except for the right index finger while for the left hand no significant different exist in their median score. From the present study, ulnar loop pattern is the most commonly occurring pattern followed by whorls, arches and radial loop. This is also in consonance with the study of Kriti *et al.* (2022). Also from the present study, the test of association also showed significant association in the left little finger and academic performance.

Again in the present there is no significant relationship observed between ATD angle and academic performance of Madonna University students. R-square value was at zero which indicates no accuracy in the prediction of academic performance and ATD angle. The change in the average score of the students is independent of the `ATD` angle changes. It also shows that whatever changes observed could possibly be due to chance. This study is in line with study of Kriti *et al.* (2022) who found out a weak negative correlation between ATD angle and academic performance. Though the correlation established is weak but the nature being negative indicates that with the increase in ATD angle there may be a decrease in academic performance of the students. This could be as a result of the small sample size used for the study.

CONCLUSION

In conclusion this study has shown that there is significant association between finger patterns (especially right little finger and left index finger) and academic performance. However, ATD angle on the other hand did not show any significant difference with academic performance among the students. This implies that while finger patterns may be used to predict academic performance, ATD angle on the other hand may not serve a better tool in predicting academic performance among Madonna University students. However more research work is needed in this area precisely with higher sample size.

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REFERENCES

- Abhimanyu MP, Bottiger W, Singh GD 2016. An Exploratory Study about Client Satisfaction in Dermatoglyphics Multiple Intelligence Tests. Indian J. Appl. Res. 2:802-806.
- Anu S, Veena S, Poonam S. 2022. Dermatoglyphic: A Review on Fingerprints and their Changing Trends of Use Review Article. Chrismed J. Health Res. 5(3):167-172.
- Bhat GM, Mukhdoomi MA, Shah BA, Ittoo MS. 2014. Dermatoglyphics: In Health and Disease – A Review. International Journal of Research in Medical Sciences, 2(1):31-37.
- Bulagouda RS, Patil PJ, Hadimani GA, Bannur BM, Patil BG, Mallashetty NS, Bagoji IB 2013. Study of Palmar Dermatoglyphics in Patients with Essential Hypertension between the Age Group of 20-50 Years. International Journal of Medical Research and Health Sciences, 2(4):773-77.
- Chimne HD, Ksheersagar DD. 2012. Dermatoglyphics in Angiographically proven Coronary Artery Disease. J. Anat. Soc. India, 61(2): 262-268.Cummins H, Midlow C (1961). Finger Prints, palm and sole.An introduction to dermatoglyphics.Dover Publication.Inc New York.
- Cummins H, Midlow C. 1961. Finger Prints, palm and sole. An introduction to dermatoglyphics. Dover PublicationInc. New York.
- Etsey K. 2005. Causes of Low Academic Performance of Primary School Pupils in the Shama Sub-Metro of Shama Ahanta East Metropolitan Assembly (SAEMA) in Ghana. In: Regional

Conference on Education in West Africa Dakar, Senegal.

- Galton F. 1892. Finger Prints. London: McMillan and Co.
- Hirsch W, Schweighel J. 1973. Morphological Evidence Concerning the Problem of Skin Ridge Formation. J. Intellect. Disabil. Res., 17:58-72.
- Jeewandeep K, Arvinder PSB. 2013. Role of Dermatoglyphics in Medical Disorders. Indian Journal of Fundamental and Applied Life Science, 3(3):536-539.
- Kriti S, Sheetal M, Akshita R, Anshika J. 2022. Dermatoglyphics Patterns and Academic Performance of College Students: A Relationship? SALT J. Sci. Res. Health, 2:34-39.
- Lainhart JE, Piven J, Wzorek M, Landa R, Santangelo SL, Coon H, Folstein SE. 1997. Macrocephaly in Children and Adults with Autism. Journal of American Academy and Child Adolescent Psychiatry, 36:282-290.
- Leeson P, Ciarrochi J, Heaven PCL. 2008. Cognitive Ability, Personality, and Academic Performance in Adolescence. Personality and Individual Differences, 45:630-635.
- Mlambo V. 2012. An analysis of Some Factors Affecting Student Academic Performance in an Introductory Biochemistry Course at the University of the West Indies.The Caribbean Teaching Scholar 1.
- Mollic MJH, Habib MA. 2011. Dermatoglypichs A Good Tool in Preventive Medicine. Journal of Armed Forces Medical College, 7(2):01-02.
- Naffah J. 1977. Dermatoglyphic analysis: Anthropological and Medical Aspects. Bulletin of the New York Academy of Medicine, 653:681.
- Oghenemavwe LE, Osaat RS. 2015. An Improvise Easy Digital Method for Palmar and Plantar Dermatoglyphics. Bioscience and Bioengineering, 1(3):88-89.
- Oladipo GS, Okoh PD, Oghenemavwe LE, Yorkum LK. 2013. Dermatoglyphic Patterns of Autistic Children in Nigeria. Journal of Biology, Agriculture and Healthcare, 3(7):80-83.
- Osaat RS. 2025. Dermatoglyphics in Down's Syndrome. African Research Journal of Medical Sciences, 2(2):43-46.
- Pratibha R, Abhilash PR, Herald JS, Anuja N, Priya P, Chandrasekar T, Sentamilselvi G, Janaki VR. 2011. Conventional Dermatoglyphics – Revived Concept: A Review. International Journal of Pharmacology and Biological Sciences, 2(3):446-457.
- Rohde TE, Thompson LA. 2007. Predicting Academic Achievement with Cognitive Ability. Intelligence, 35:83-92.
- Sandeep VP, Bharat SB, Megha AD, Vigary PM 2012. Study of the Fingertip Pattern as a Tool for the Identification of the Dermatoglyphic Tract in Bronchial Asthma. Journal of Clinical and Diagnostic Research, 6(8):1397-1400.
- Schaumann B, Alter M. 1976. Dermatoglyphics in medical disorders. Newyork Springer Verlag, Berlin. PP 27- 87
- Walker HA. 1977. A Dermatoglyphic Study of Autistic Patients. Journal of Autism and Childhood Schizophrenia, 7(1):11-21.