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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/13820
DOI URL: http://dx.doi.org/10.21474/IJAR01/13820

RESEARCH ARTICLE

ANTHROPOMETRIC ASSESSMENT OF DIGIT LENGTHS AND DIGIT RATIOS OFVITILIGO SUBJECTS IN PORT HARCOURT,RIVERS STATE

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Manuscript Info

Manuscript History
Received: 29 September 2021
Final Accepted: 31 October 2021
Published: November 2021

Key words:-
Vitiligo, Digit ratio and Anthropometry

Abstract

Vitiligo is a skin pigmentation disorder that is caused by a loss of melanocytes, characterized by white spots around certain parts of the body. The aim of this study was to investigate the relationship between digit length, digit (2D:4D) ratio and vitiligo among vitiligo patients within a south-southern Nigeria. Informed consents were obtained from 98 vitiligo adult subjects (69 females and 29 males) in the age range of 18 – 50 years. The measurements that were obtained were the digit lengths of second and fourth fingers for both hands using the digital vernier caliper. The mean and standard deviation values were calculated for all measurements. A Pearson correlation was used to analyse the relationship between the various measurements for both hands in the study. Results showed that the mean ± standard deviation of the various parameters for the female category. Right 2D length was 6.67± 7.53cm, left 2D length was 6.68 ± 7.32cm, right 4D length and left 4D length were 6.86 ± 8.57cm and 6.89 ± 8.50cm respectively. While, the mean and standard deviation values for right and left 2D:4D ratios for the female category were 0.98 ± 0.15 and 0.98 ± 0.12 respectively. In the males, right 2D length was 6.66 ± 9.66cm, left 2D length was 6.64 ± 9.86cm, right 4D length and left 4D length were 6.99 ± 10.09cm and 7.03± 10.40cm respectively. While, the mean and standard deviation values for right and left 2D:4D ratios for the male category were 0.95 ± 0.03 and 0.95 ± 0.03 respectively. In the females for the right hand, there was a significant positive correlation between 2D length and 4D length ($r = 0.761$, $p = 0.000$) while there was a significant negative correlation between 4D length and digit ratio ($r = -0.473$, $p = 0.000$) at $p < 0.01$. For the left hand, there was a significant positive correlation between 2D length and 4D length ($r = 0.783$, $p = 0.000$). In the males for the right hand, there was a significant positive correlation between 2D length and 4D length ($r = 0.976$, $p = 0.000$). For the left hand, there was a significant positive correlation between 2D length and 4D length ($r = 0.981$, $p = 0.000$).It can be concluded that the knowledge of 2D:4D ratio among vitiligosubjects could be helpful in clinical anthropometry; however, more research has to be done considering that the sample size of this study is relatively small.

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Introduction:-

Vitiligo is a skin pigmentation disorder that is caused by loss of melanocytes which results in the dilution of skin pigments in affected areas of the skin of the affected individual. It is also known to be an auto-immune disease, associated with genetic and environmental factors, as well as metabolic factors (Ezzedineet al., 2012; Picardoet al., 2015).It is estimated that close to 2% of global population are affected by this disease (Alikhanet al., 2011; Kruger and Schallreuter, 2012). It is not racial-specific as it affects all people of various populations across the world (Ezzedineet al., 2015).Also, it affects both sexes even though in some studies, it has been shown that females seek medical help in treating it due to negative social impactthey face more compared to males (Das et al., 1985; Alikhanet al., 2011).The digit ratio 2D:4D refers to the ratio of the length of the second finger to that of the fourth finger (Unalet al., 2015).A number of studies have made reports on the relationship between 2D:4D ratio and diseases such as androgeneticalopecia (Unalet al., 2018), acne vulgaris (Bilgicet al., 2015), hormone levels (Manning et al., 2004), sperm count (Manning et al., 2014), myocardial infarction (Kyriakidiset al., 2010), seborrheic dermatitis (İslamoğlu, 2019) and cancer (Bunevicius, 2018). Digit ratio has also has been reported to show relationship with faculty. In a study by Gwunireama et al 2013, they reported no sexual dimorphism for the hardcore science group with a ratio of 0.96. In that same study, biological science group had 0.97 for males and 1.00 for females.However, thereseems to be no study to show the relationship between digit ratio and vitiligo in any Nigerian population. Therefore, the aim of this study was to investigate the possible association between digit length, digit ratio and vitiligo amongst Nigerians in Port Harcourt, Rivers State.

Methodology:-

Ninety eight (98) vitiligosubjects between the ages of 18 – 50 years were used for this study after obtaining their informed consent. Sixty nine were females (70.41%) and twenty nine(29.59%) were males. Their second and fourth digits of the hand (right and left)were measured using a digital Vernier caliper. The digits were measured from the proximal crease to the tip of the finger (Manning et al., 1998). Subjects with hand deformities were excluded from this study. Digit ratio was calculatedas the ratio of the length of the second finger to that of the fourth finger (Unalet al., 2015). The mean and standard deviation values were calculated for all measurements. A Pearson correlation was used to analyze the relationship between the various measurements for both hands in the study. All data were analyzed using the Statistical Package for Social Sciences (SPSS) version 23.

Results:-

The results of the present study is presented in four tables as shown below

Table1:- Descriptive statistics of 2D length, 4D length and ratios of female vitiligo subjects.

Parameters	Number (N)	Mean ± S.D	S.E.M
Right 2D length	69	6.67 ± 7.53	0.91
Left 2D length	69	6.68 ± 7.32	0.88
Right 4D length	69	6.86 ± 8.57	1.03
Left 4D length	69	6.89 ± 8.50	1.02
Right 2D:4D ratio	69	0.98 ± 0.15	0.02
Left 2D:4D ratio	69	0.98 ± 0.12	0.02

Table 2:- Pearson's correlation between 2D length, 4D length and digit ratios of female vitiligo subjects (** Correlation is significant at the 0.01 level).

		Right_2D	Right_4D	Ratio_R	Left_2D	Left_4D	Ratio_L
Right_2D	Pearson Correlation	1	.761**	.193	.985**	.767**	.158
	Sig. (2-tailed)		.000	.112	.000	.000	.194
	N	69	69	69	69	69	69
Right_4D	Pearson Correlation	.761**	1	-.473**	.746**	.703**	-.008
	Sig. (2-tailed)	.000		.000	.000	.000	.948
	N	69	69	69	69	69	69
Ratio_R	Pearson Correlation	.193	-.473**	1	.207	.039	.151
	Sig. (2-tailed)	.112	.000		.087	.751	.216

	N	69	69	69	69	69	69
Left_2D	Pearson Correlation	.985**	.746**	.207	1	.783**	.146
	Sig. (2-tailed)	.000	.000	.087		.000	.232
	N	69	69	69	69	69	69
Left_4D	Pearson Correlation	.767**	.703**	.039	.783**	1	-.485**
	Sig. (2-tailed)	.000	.000	.751	.000		.000
	N	69	69	69	69	69	69
Ratio_L	Pearson Correlation	.158	-.008	.151	.146	-.485**	1
	Sig. (2-tailed)	.194	.948	.216	.232	.000	
	N	69	69	69	69	69	69

Table 3:- Descriptive statistics of 2D length, 4D length and ratios of male vitiligo subjects.

Parameters	**Number (N)**	**Mean ± S.D**	**S.E.M**
Right 2D length	29	6.66 ± 9.66	1.80
Left 2D length	29	6.64 ± 9.86	1.83
Right 4D length	29	6.99 ± 10.09	1.87
Left 4D length	29	7.04 ± 10.40	1.93
Right 2D:4D ratio	29	0.95 ± 0.03	0.01
Left 2D:4D ratio	29	0.95 ± 0.03	0.01

Table 4:- Pearson's correlation between 2D length, 4D length and ratios of male vitiligo subjects. (** Correlation is significant at the 0.01 level).

		Right_2D	Right_4D	Ratio_R	Left_2D	Left_4D	Ratio_L
Right_2D	Pearson Correlation	1	**.976****	.084	**.996****	**.979****	.097
	Sig. (2-tailed)		.000	.666	.000	.000	.618
	N	29	29	29	29	29	29
Right_4D	Pearson Correlation	**.976****	1	-.133	**.981****	**.992****	-.045
	Sig. (2-tailed)	.000		.492	.000	.000	.817
	N	29	29	29	29	29	29
Ratio_R	Pearson Correlation	.084	-.133	1	.041	-.083	**.650****
	Sig. (2-tailed)	.666	.492		.833	.669	.000
	N	29	29	29	29	29	29
Left_2D	Pearson Correlation	**.996****	**.981****	.041	1	**.981****	.105
	Sig. (2-tailed)	.000	.000	.833		.000	.590
	N	29	29	29	29	29	29
Left_4D	Pearson Correlation	**.979****	**.992****	-.083	**.981****	1	-.087
	Sig. (2-tailed)	.000	.000	.669	.000		.655
	N	29	29	29	29	29	29
Ratio_L	Pearson Correlation	.097	-.045	**.650****	.105	-.087	1
	Sig. (2-tailed)	.618	.817	.000	.590	.655	
	N	29	29	29	29	29	29

The results from table 1 show the mean ± standard deviation of the various parameters for the female category. Right 2D length was 6.67 ± 7.53cm, left 2D length was 6.68 ± 7.32cm, right 4D length and left 4D length were 6.86 ± 8.57cm and 6.89 ± 8.50cm respectively. The mean and standard deviation for the right and left 2D:4D ratios for the female category were 0.98 ± 0.15 and 0.98 ± 0.12 respectively.

Table 2 depicts the correlation between the measurements of right and left hand for female subjects. For the right hand, there was a significant positive correlation between 2D length and 4D length ($r = 0.761$, $p = 0.000$) and a significant negative correlation between 4D length and digit ratio ($r = -0.473$, $p = 0.000$) at $p < 0.01$. For the left hand, there was a significant positive correlation between 2D length and 4D length ($r = 0.783$, $p = 0.000$) and a significant negative correlation between 4D length and digit ratio ($r = -0.485$, $p = 0.000$) at $p < 0.01$. Furthermore, there was a significant positive correlation between the 2D lengths for both hands ($r = 0.985$, $p = 0.000$) and 4D

lengths for both hands (r = 0.703, p = 0.000). Also, there was a significant positive correlation between left 2D length and right 4D length (r = 0.746, p = 0.000) while there was a significant correlation between left 4D length and right 2D length (r = 0.767, p = 0.000). There was a significant negative correlation between left 4D length and left digit ratio (r = -0.485, p = 0.000).

The results from table 3 below show the mean ± standard deviation of the various parameters for the male category. Right 2D length was 6.66 ± 9.66cm, left 2D length was 6.64 ± 9.86cm, right 4D length and left 4D length were 6.99 ± 10.09cm and 7.03 ± 10.40cm respectively. While, the mean and standard deviation values for right and left 2D:4D ratios for the male category were 0.95 ± 0.03 and 0.95 ± 0.03 respectively.

Table 4 below shows the correlation between the measurements of right and left hand for male subjects. For the right hand, there was a significant positive correlation between 2D length and 4D length (r = 0.976, p = 0.000). For the left hand, there was a significant positive correlation between 2D length and 4D length (r = 0.981, p = 0.000). Furthermore, there was a significant positive correlation between the 2D length for both hands(r = 0.996, p = 0.000) and 4D lengths for both hands (r = 0.992, p = 0.000). Also, there was a significant positive correlation between left 2D length and right 4D length (r = 0.981, p = 0.000) and there was a significant correlation between left 4D length and right 2D length (r = 0.979, p = 0.000). Finally, there was a significant correlation between left digit ratio and right digit ratio (r = 0.650, p = 0.000).

Discussion:-

Vitiligo is a skin disorder that is characterized by white spots found usually on the fingers, knuckles, feet, mouth and genitals (Nordlund and Ortonne, 2006). Vitiligois said to be a multifactorial disorder that is usually characterized by loss of functional melanocytes and these factors range from autoimmune to genetic mechanisms (Le Polleet al., 1993). It is safe to say that both sexes are affected by this disease; however this disease affects the social orientation of females compared to males (Alikhanet al., 2011). The ratio of the length of the second finger to the fourth finger (also known as digit ratio or the 2D:4D ratio) has been proposed as a marker for prenatal hormone (testosterone and estrogen) exposure (Manning et al., 1998).

A number of studies have made reports on the relationship between 2D:4D ratio and diseases such as androgeneticalopecia, acne vulgaris, myocardial infarction, seborrheic dermatitis and cancer (Unalet al., 2018; Manning et al., 2004;Oktenet al., 2002; Bilgicet al., 2015; Bunevicius, 2018; Kyriakidiset al., 2010). It is important to note that it is about the first study that has been done to access the digit lengths and ratios of vitiligo subjects in a Nigerian population.

In this study, the values of the ratios of males and females were 0.95 and 0.98 respectively. These ratios were masculine suggesting very increased levels of testosterone concentration in both males and females. According to Manning et al, 2003, more masculine finger ratios are associated with androgen alleles. Islamoglu (2019), in a study of 2D:4D ratios in seborrheic dermatitis male patients, also reported masculine ratios consistent with the findings in this study.

Finally, the sexual difference observed in this study was consisted with several studies on digit ratios (Manning et al 2004, Manning et al 1998,Unal et al 2018). However, it contrasted the results obtained when academic staff in the hardcore sciences was studied by Gwunireama et al 2013. In that study no sexual difference was not observed between males and females in the group.

Conclusion:-

This study conclusively documented the values of the digit ratio of subjects with vitiligo. The knowledge of 2D:4D ratio among vitiligo subjects could be helpful in clinical anthropometry and more research has to be done.

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