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A Study on the Nail Size Measurement of Korean Adult Women -Focused on women in their 20s, 30s and 40s-

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Abstract

Korean nail-beauty is mainly concentrated on women in their 20s and 40s. The purpose of this study is to investigate the structure and characteristics of nails based on the literature and to measure the nail size of adult women in their 20s to 40s as an empirical study. The purpose of this study is to utilize the measurement results as basic data for the standardization of nail size through comparative study with previous studies. For the study method, 150 (50 for each age group) adult female in 20 ~ 40 years with cuticle removed for 30 days from September 17 to October 16, 2017 were measured. As the result, As a result of measurements, the width of the nail was almost similar to that of the researcher. However, the thumb was 1.01 mm longer than the results of the previous researchers. The index nail was 1.12 mm longer, the middle nail was 0.82 mm longer, and the ring nail was 1.3 mm longer than the previous study.

Ⅰ. Introduction

In modern society, the value of information is maximized, Society has been developed(E. Kim, 2010). In the 21st century, beauty has become a science through the Internet and media, and the world has shared the beauty of global beauty through information(Kim, 2011).

In Korea, nail beauty focuses on the women aged 20s~40s, to other beauty industry, and as the nail materials and functional products reflecting their taste are released, such products are rapidly distributed through sharing of self nail art video such as YouTube, Facebook, Instagram, etc.

Nail art is divided into basic nail care and artificial

nail care. Basic nail care is mainly of manicure type care from the healthy aspect of hand and nail, and artificial nail care includes nail tip extension, silk extension, acrylic, gel nail, etc. by attaching nail tip to the nail to maximize beauty and nail function, emphasizing individuality(Choe, 2016).

To investigate the advanced research on nail shape and size, Yeo Hyeyeon and others' research(Ye & Kim, 2017) measured nail shape size targeting 600 Korean adult women aged 20s~40s, and An Eunju and others'(An, 2017) research conducted a comparative analysis of nail size per korean and overseas brand by measuring artificial nail tip size distributed in korean and overseas market, and a comparative analysis with Korean women's nail shape. Kim Jeonghee and others'(Kim, 2017) research analyzed Korean adult women's nail type and conducted a comparative analysis of artificial nail tip size per number. Also, Jeong Jinwoo's research (Jung, 2015) suggested nail size measurement targeting 300 adult men· women.

The purpose of this study is to investigate the structure and characteristics of nails based on the literature and to measure the nail size of adult women in their 20s to 40s as an empirical study. The purpose of this study is to utilize the measurement results as basic data for the standardization of nail size through comparative study with previous studies. Of course, it is the same study as the experimental age group of the researchers, but it was judged that more studies should be done for size standardization.

As the research method, this research established the results through a comparative analysis between nail size measurement and advanced research result targeting 150 korean adult women aged 20s~40s(50 persons per age group), removed with cuticle for 30 days between Sept 17 and Oct 16, 2017.

Nail size measurement was performed using Digital Caliper(1108-150W, spec 150mm/ 0.01mm)150W to measure nail width and length and Radius gauge (Radius gauge, 78MA, 178MB, measurement range 1.0-15mm, Japan) for nail curvature measurement, minimizing error range of nail size by establishing 6 il surface standard points.

Ⅱ. Theoretical Background

1. Structure of nail

Nail, a small mirror that shows body health, is the affiliated organ as well as the extension of the skin. It is composed of keratin and protein, and the structure of nail is composed of the nail itself, beneath the nail, and nail skin(Jung, 2016).

It is composed of nail body and nail root, which is nail itself, also, nail beneath, such as free edge, which is end tip, nail bed, matrix, and lunula, and nail skin, such as eponychium, hyponchium, and nail groove(Choe. 2010). Nail part and cross section are as in below(Figure 1), (Figure 2).

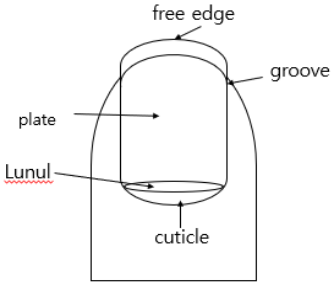

Figure 1. Nail Part

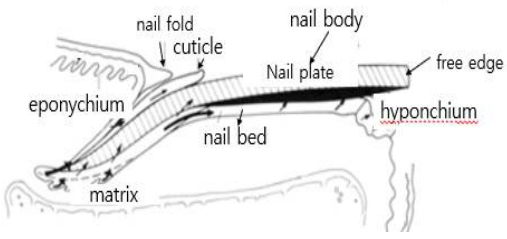

Figure 2. Cross Section of Nail
(Douglas D, 2005, p. 3)

Nail body is also called nail plate, which is nail itself. Nail body doesn't need oxygen, which has no nerve or blood vessel, made of keratin, same chemical substance as hair(Douglas, 2005).

Nail root is also called root forming substance, a thin and soft part buried beneath the nail, provided with oxygen from the capillary vessel of nail bed, where growth of nail starts by generating new cell(Gwon, 2017).

Jayuyeon is also called free edge, end tip of nail which is not attached to nail bed, where the length and shape of nail can be freely adjusted(Gwon, 2017).

Beneath the nail is called as nail bed, which supports nail body, distributed with vessel and nerve, performs metabolism of nail and provides moisture(Gwon. 2017). Nail matrix is also called a matrix, located under the nail root, distributed with vessel and nerve, regulating production and growth of keratin(Gwon, 2017). Once matrix is damaged, the influence appears generally on nail plate, in case the damage is severe, it can be permanently transformed(Dougles, 2005).

Lunula is the lower part in half moon shape, where the matrix and nail bed meet, not perfectly keratinized(Gwon, 2017).

Nail cuticle is the skin covering around the nail, keratinized skin with no nerve, protecting nail· toenail from microorganism and pathogenic fungus, normal cuticle maintains proper moisture and elasticity with no crack(M. Nam, 2015).

Nail cuticle is the skin covering around the nail, keratinized skin with no nerve, protecting nail· toenail from microorganism and pathogenic fungus, normal cuticle maintains proper moisture and elasticity with no crack(M. Nam, 2015). Nail groove is the skin to be made to grow along with the grooves on both sides of nail bed.

Perioniumium is the edge part of the skin surrounding the whole nail, and euponychium is a thin skin on the nail base, thin film under the cuticle, partly covering lunula. Hyponychium is the skin underneath the free edge part, which protects the nail from the virus(M. Nam, 2015).

2. Characteristics of nail

Nail is also important medically, since it shows a person's health state to some degree(Y. Kim, 2010). However, wrong nail care during a long time by such women who pay more attention to excessively fancy and beautiful decoration can lead damage of nail, and due to such nail damage, the number of nail patients who experience various nail disease and need treatment steadily increases(Ham, 2014). If one has disease in body or has poor metabolism, nail changes, and the color or spot on the nail is determined according to the disease state or syndrome, also, the characteristic of nail differs(M, Nam, 2015). Nail can determine the health state, for example, blue nail displays poor blood circulation, mental overwork and stress, pale nail displays anemia, nutrition lesion, and heart disease, red or wine colored nail displays no elasticity or breakage in capillary vessel, horizontal line or furrowed nail displays mental illness, overwork, acute infectious disease, and malnutrition(Yoon, 2014). Also, nail shape differs according to physical characteristic.

Basic shapes of nail are square, round square, round, oval, and pointed shape. Square is making angles without rounding both edges, proper for the customers with active occupation, round square is rounded edge on the square nail, refined and urban sense, round shape is gentle round shape preferred by male customers, oval shape is preferred by the women in service work who reveal their hands frequently, which is elegant and beautiful, and pointed shape makes the finger thin and long, however it breaks well(Lim & Kim, 2014). Figure 3 shows 5 basic shapes of nail.

Ⅲ. Nail-size Measurement per Age Group

The researcher determined that the relevant research is necessary, since there's no clear standardization work of nail size in korean so far. In this text, this research measured nail size of Korean adult women per age group, and suggested the standard value.

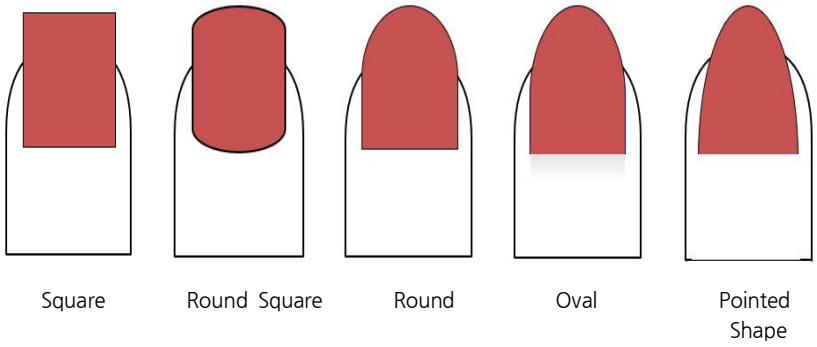

Figure 3. 5 Basic Shapes of Nail

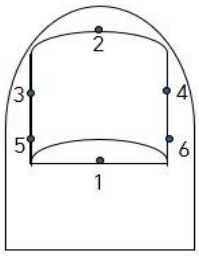

Figure 4.
Nail Standard Point

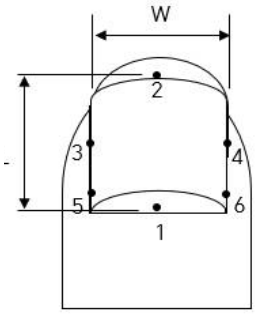

Figure 5.
Nail Vertical Length and Horizontal Length

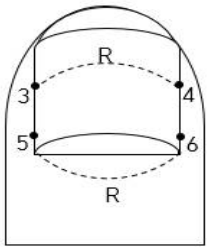

Figure 6.
Nail Curvature Length

1. Measurement target and period

Research target was Korean adult women with healthy nail, total 150 aged 20s, 30s, and 40s, 50 persons per age group, removed with cuticle. Measurement period was 30 days between Sept 17 and Oct 16, 2017.

2. Measurement tool

Measurement of vertical length and width of nail was performed using Digital Caliper(1108~150W, spec 150mm/ 0.01mm)150W, and for nail curvature measurement, Radius gauge(78MA,178MB, measurement range 1.0-15mm, Japan) was used.

3. Measurement standard point and measurement items

Figure 4 established minimization of error range of nail size based on 6 standard points of measurement established by the researcher. Figure 5 established the right hand as the basic measurement item, and nail size measurement was performed vertically from the standard point 1 to standard point 2 to measure nail size. Center width length (horizontal width) of nail was measured with 2 parts, horizontal distance between the standard point 3 and standard point 4, and lower width length (horizontal width) between the standard point 5 and standard point 6. Figure 6 is curvature of nail, which

measured the middle curve length between the standard points 3 and 4, and lower curve length between the standard points 5 and 6. Measurement of right hand nail size was performed with 5 items, thumb, index finger, middle finger, ring finger, and little finger, with total 25 measurement values.

4. Result of nail size measurement

Analysis of data was performed using SPSS Statistics 21.0 for windows program. The average and standard error of measurement was performed based on the result of direct measurement of nail shape of 150 persons aged 20s~40s, 50 persons per age group, and comparative analysis of the advanced research of nail measurement of Yeo, 2017) and others, after performing descriptive statistics.

The researcher's descriptive statistics of the measurement of the nail shape displayed the vertical length average of thumb, 13.84(±0.11)mm, middle width, 12.30(±0.09)mm, largest among the size of five nails. Vertical length and middle width of index finger nail displayed respectively 12.58(±0.11)mm, 9.54(±0.08)mm, and the vertical length and middle width of middle finger nail displayed respectively 12.63(±0.15)mm, 9.97(±0.10)mm. Vertical length and middle width of ring finger displayed 12.25(±0.13)mm, 9.14(±0.08)mm, accordingly, vertical length and middle width of index finger, middle finger, and ring finger displayed very similar average. Little finger displayed vertical length 11.12(±0.62)mm, vertical length and middle width, 7.22(±0.06).

To see the research result of Korean adult women's nail shape performed by Yeo Hyeyeon's advanced research(Yeo, 2017), the average nail vertical length of thumb, index finger, middle finger, and ring finger displayed respectively 12.83(±0.8)mm, 11.46(±0.87)mm, 11.81(±1.04)mm, 11.49(±1.09)mm, 9.82(±0.06mm), and middle width, 12.60(±089)mm, 9.83(±0.87)mm, 10.38(±0.79)mm, 9.70(±0.88)mm, 7.85(±0.06)mm.

Here, as the comparative analysis result between the researcher's measurement result of Korean adult women's nail size and the advanced research, middle width length was analyzed very similarly, while a difference appeared in the measurement of thumb, index finger, middle finger, and little finger except the ring finger, which is considered as the difference in the age and the number of sample of research target and whether of nail care (cuticle removal). Table 1 displays the researcher's measurement, and table 2 displays a descriptive statistical comparative analysis of the advanced research and the researcher's measurement.

Ⅳ. Conclusion

Nail measurement analyzed mainly with Korean adult women displayed, vertical length average of thumb nail, 13.84(±0.11)mm, middle width, 12.30(±0.09)mm, the largest among the five nails. Vertical length and middle width of index finger nail displayed respectively 12.58(±0.11)mm, 9.54(±0.08)mm, and the vertical length and middle width of middle finger nail displayed 12.63(±0.15)mm, 9.97(±0.10)mm. Vertical length and middle width of ring finger nail displayed 12.25(±0.13)mm, 9.14(±0.08)mm, accordingly, the vertical length and middle width of index finger, middle finger, and ring finger nail displayed very similar average value. Little finger nail displayed vertical length 11.12(±0.62)mm, while vertical length and middle width, 7.22(±0.06).

A comparative analysis result of the measurement of the advanced research is as follows. Thumb nail appeared the largest, while the vertical length and middle width of index, middle, and ring finger displayed very similar average. Also, as the result of comparative analysis with the direct measurement of the advanced research, middle width length was analyzed very similarly, and a difference was confirmed in the measurement of thumb, index, middle, and ring nail except little nail. To summarize, the thumb was 1.01 mm longer than the results of the previous researchers. The index nail was 1.12 mm longer, the middle nail was 0.82 mm longer, and the ring nail was 1.3 mm longer than the previous study.

Table 1. Descriptive Statistics of the Researcher's Measurement (unit: mm)

Digit	Site	20s		30s		40s		Total	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Thumb nail	vertical	13.09	.19	14.36	.20	14.07	.17	13.84	.11
	middle width	11.82	.16	12.40	.15	12.68	.13	12.30	.09
	lower width	10.56	.13	11.50	.15	11.58	.13	11.22	.09
	middle curve	8.73	.132	9.56	.85	9.53	.08	9.27	.06
	lower curve	7.43	.12	8.33	.10	8.31	.11	8.02	.07
Index nail	vertical	11.57	.17	13.11	.21	13.05	.15	12.58	.11
	middle width	8.99	.11	9.89	.14	9.73	,12	9.54	.08
	lower width	7.55	.08	8.58	.19	8.61	.12	8.25	.09
	middle curve	6.42	.08	7.16	.07	7.15	.11	6.91	.06
	lower curve	5.32	.08	5.93	.12	5.91	.14	5.72	.07
middle nail	vertical	11.41	.29	13.23	.25	13.26	.17	12.63	.15
	middle width	9.22	.13	10.39	.22	10.29	.14	9.97	.10
	lower width	7.83	.11	8.91	.15	9.05	.13	8.60	.09
	middle curve	6.51	.08	7.32	.09	7.62	.12	7.15	.07
	lower curve	5.27	.08	6.17	.10	6.30	.14	5.91	.07
Ring nail	vertical	11.45	.19	12.73	.27	12.58	.19	12.25	.13
	middle width	8.45	.10	9.64	.16	9.34	.13	9.14	.08
	lower width	7.27	.09	8.49	.15	8.19	.12	7.9	.08
	middle curve	6.04	.07	6.77	.09	6.88	.12	6.56	.06
	lower curve	4.92	.06	5.67	.08	5.70	.12	5.43	.06
Little nail	vertical	11.36	1.86.	10.86	.25	11.15	.17	11.12	.62
	middle width	6.81	.08	7.32	.13	7.52	.11	7.22	.06
	lower width	5.71	.09	6.38	.12	6.68	.10	6.26	.07
	middle curve	5.89	1.00	5.37	.06	5.34	.07	5.53	.33
	lower curve	4.00	.07	4.66	.06	4.38	.08	4.34	.04

The reason for this difference in size is considered to be hand measurement. Therefore, it is required to perform accurate measurement through 3D scanner in the subsequent research. In addition, the limitation of this study is that the sample size is small and the age range is not diversified.

However, this study attempted to approach the standardization of nails by comparing with previous studies.

This research is expected to be utilized as the basic material for Korean adult women's nail size standardization work.

Table 2. Descriptive Statistical Comparative Analysis of the Advanced Research and the Researcher's Measurement

(unit: mm)

Digit	Site	20's				30's				40's				Total			
		Mean		S.D.		Mean		S.D.		Mean		S.D.		Mean		S.D.	
		Yeo	Thisresearcher	Yeo	Thisresearcher	Yeo	Thisresearcher	Yeo	Thisresearcher	Yeo	Thisresearcher	Yeo	Thisresearcher	Yeo	Thisresearcher	Yeo	Thisresearcher
Thumb nail	Length	12.72	13.09	1.15	.19	12.95	14.36	.40	.20	12.85	14.07	.46	.17	12.83	13.84	.80	.11
	Middle width	12.03	11.82	.96	.16	12.94	12.40	.55	.15	13.01	12.68	.63	.13	12.60	12.30	.89	.09
	Bottom width	11.63	10.56	.89	.13	11.60	11.50	.76	.15	11.82	11.58	.71	.13	11.68	11.22	.81	.09
	Middle curve width	14.16	8.73	1.18	.132	14.36	9.56	.47	.85	14.53	9.53	.82	.08	14.33	9.27	.92	.06
	Bottom curve width	12.50	7.43	1.17	.12	12.68	8.33	.62	.10	12.85	8.31	.69	.11	12.66	8.02	.91	.07
Index nail	Length	11.11	11.57	.97	.17	11.44	13.11	.57	.21	11.93	13.05	.73	.15	11.46	12.58	.87	.11
	Middle width	9.42	8.99	.83	.11	9.95	9.89	.68	.14	10.26	9.73	.84	,12	9.83	9.54	.87	.08
	Bottom width	9.01	7.55	.81	.08	8.82	8.58	.57	.19	9.09	8.61	.70	.12	8.98	8.25	.72	.09
	Middle curve width	11.56	6.42	.99	.08	11.40	7.16	.77	.07	11.50	7.15	.67	.11	11.49	6.91	.84	.06
	Bottom curve width	9.93	5.32	.89	.08	9.99	5.93	.52	.12	10.11	5.91	.52	.14	10.00	5.72	.70	.07
Middle nail	Length	11.07	11.41	1.04	.29	12.20	13.23	.74	.25	12.41	13.26	63	.17	11.81	12.63	1.04	.15
	Middle width	9.91	9.22	.87	.13	10.67	10.39	.46	.22	10.72	10.29	.59	.14	10.38	9.97	.79	.10
	Bottom width	9.48	7.83	.88	.11	9.38	8.91	.45	.15	9.47	9.05	.61	.13	9.45	8.60	.69	.09
	Middle curve width	12.30	6.51	.95	.08	12.00	7.32	.49	.09	12.32	7.62	.91	.12	12.21	7.15	.84	.07
	Bottom curve width	10.58	5.27	.93	.08	10.38	6.17	.59	.10	10.41	6.30	.67	.14	10.47	5.91	.77	.07
Ring nail	Length	10.78	11.45	1.05	.19	11.95	12.73	.86	.27	11.99	12.58	.78	.19	11.49	12.25	1.09	.13
	Middle width	9.14	8.45	.98	.10	10.16	9.64	.51	.16	9.99	9.34	.59	.13	9.70	9.14	.88	.08
	Bottom width	8.79	7.27	.93	.09	8.94	8.49	.46	.15	8.80	8.19	.51	.12	8.84	7.99	.70	.08
	Middle curve width	11.54	6.04	.99	.07	11.62	6.77	.57	.09	11.67	6.88	.77	.12	11.60	6.56	.82	.06
	Bottom curve width	9.98	4.92	.87	.06	9.82	5.67	.43	.08	9.91	5.70	.67	.12	9.91	5.43	.70	.06
Little nail	Length	9.30	11.36	1.08	1.86.	10.09	10.86	.87	.25	10.23	11.15	.91	.17	9.82	11.12	1.06	.62
	Middle width	7.34	6.81	.96	.08	8.23	7.32	.41	.13	8.16	7.52	.41	.11	7.85	7.22	.80	.06
	Bottom width	7.10	5.71	.90	.09	7.38	6.38	.35	.12	7.29	6.68	.37	.10	7.24	6.26	.64	.07
	Middle curve width	8.93	5.89	.75	1.00	8.99	5.37	.70	.06	9.52	5.34	.90	.07	9.12	5.53	.82	.33
	Bottom curve width	7.71	4.00	.82	.07	7.91	4.66	.44	.06	8.29	4.38	.59	.08	7.95	4.34	.70	.04

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