

A Comparative Study of the Effects of Age and Smoking on Nail Growth Rate in Healthy Individuals

GhadaA. Al Omran* MBChB, DDV
 AdilA. Noaimi** MBChB, DDV, FICMS
 Zaid Al Madfai* MBChB, MSc, PhD
 Hayder Al Hamamy** MBChB, DDV, MSc, PhD, CABD

Summary:

Background: The nail organ has an important functional and aesthetic importance. Nail Growth Rate (NGR) has attracted the attention of many investigators not only due to the importance of the nail apparatus but also as a tool to reflect health.

Objective: To study the effects of smoking and age on nail growth.

Patients and methods: The study was conducted at the Department of Physiology and the Department of Dermatology, College of Medicine, University of Baghdad during the period from January 2011 to May 2011.

Nail growth measurement was performed by etching a T – mark on the nail plate of the right and the left thumbs with a wide bore needle. The vertical distance between the point of meeting of the T and the proximal nail fold was measured using (vernier). A second measurement was performed one month later. The difference between the 2 readings was divided by the number of days between the readings to give the NGR.

Results: The NGR was measured in a total of 106 subjects. The subjects were divided into 3 groups: Group1 (Smoker male subjects): 23 subjects were included in this group. Their ages ranged between 20 and 59 years with a mean of 35.87 +11.72 years. Group 2 (Non-smoker male subjects): 34 subjects were included. Their ages ranged between 13 and 52 years with a mean of 31.76 + 10.16 years. Group 3 (Non-smoker female subjects): 49 subjects were included. Their ages ranged between 8 and 58 years with a mean of 27.49 +11.66 years. NGR measurement in:

Group 1: The mean growth rate in the right thumb was 95.4 + 28.8 microns/day, and for the left thumb was 96 + 34 microns/day.

Group 2: The NGR was 105.6 + 34.35, and 103.4 + 34.24 microns /day, for the right thumb and the left thumb respectively. .

Group 3: The NGR was 100 .5 + 33.52 microns/day for the right thumb and 101.6 + 31.77 microns /day for the left thumb.

Conclusion: Age was inversely correlated with nail growth in right and left thumbs in all groups. The duration of smoking and number of cigarettes was inversely related to nail growth, but it did not reach statistical significance.

Keywords: Nail growth rate, smoking, age.

Fac Med Baghdad
 2012; Vol. 54, No.3
 Received Dec, 2011
 Accepted Feb. 2012

Introduction:

The nail organ is an integral part of the digital tip; it is both a versatile tool and one of the most important sensory organs. It has an important functional and aesthetic importance. Nail growth rate (NGR) has attracted the attention of many investigators not only due to the importance of the nail apparatus but also as a tool to reflect the health of the body. NGR reflects the state of circulation of the nail matrix and the presence of Beau's lines demonstrates the effect of general diseases on the NGR. (Tosti and Biraccini, 2008). NGR was measured in physiological states such as pregnancy (2) and

* Dept. of Physiology, College of Medicine, University of Baghdad.

**Dept. of Dermatology, College of Medicine, University of Baghdad.

disease states like psoriasis (3). Few studies dealt with the effect of smoking on NGR (4).

Patients and Methods:

The study was conducted at the Department of Physiology College of Medicine / University of Baghdad and the Department of Dermatology College of Medicine / University of Baghdad during the period from January 2011 to May 2011. It is an observational study.

Subjects were recruited from second year medical students of College of the Medicine / University of Baghdad during their Physiology laboratory sessions and Iraqi Board candidates doing their internship at the Department of Dermatology

/ Medical City teaching Hospital/Baghdad, also patients attending the Department of Dermatology for diseases not affecting the nail growth such as psoriasis, alopecia areata and lichen planus and relatives accompanying these patients. Other subjects were members of the teaching staff at the college of medicine and family member of the investigator. Subjects whose jobs involves repeated trauma to the hands were not included.

Full medical and dermatological history was obtained. They were interrogated regarding the possible use of drugs that could affect the nail growth, each person was then asked whether he smokes or not, if he is a smoker, the number of packed smoked per year was determined. The nature of the study was explained and an informed formal consent was obtained. Ethical approval for the study was granted by the scientific committee of the Iraqi Board of Medical Specializations/ Dermatology and Venereology.

The nail was examined in a good light with the help of a hand lens (X4). A T-mark was drawn on the nail by scratching (etching) the nail plate of the thumb finger by a wide bore needle gauge (18 or 19); one limb of the T was drawn horizontal to the proximal nail fold and the other limb was perpendicular to the first so that they meet at one point.

A photograph was obtained with a digital camera (Sony, Cybershot DSC-W50)

The vertical distance between this point and the proximal nail fold was measured using (vernier) in millimeters and one decimal of a millimeter was recorded. The same procedure was performed on both the right and the left thumb nails. The subject was examined again one month later. During the second visit the vertical distance between the point of meeting of the limbs of the T shape and the proximal nail fold was measured again; the difference between the second reading and the first was calculated and divided by the number of days between the two readings; this gave the growth rate of the nail in millimeters per day. This reading was converted into micrometers per day by multiplying with 1000. Nail growth rate (NGR) was measured for the right and the left thumbs.

Our subjects were divided into three groups:

Group 1: Smokers who were all males.

Group 2: Non-smoker male subjects.

Group 3: Non-smoker female subjects.

Comparison of the growth rate of the right thumb to the left thumb was done in the three groups.

Comparison of the left thumb growth rate in smoker to non-smoker males was performed. The right thumb growth rate was also compared between smoker and non-smoker male subjects. Correlation between the following factors and the nail growth rate was performed: Age of the subject, duration of cigarette in those who smoke, number of cigarettes smoked per day, the correlation between the growth rate of right and left thumb was determined in each group.

SPSS statistical package for social sciences version 17 was

used for statistical analysis.

Student's t-test was used to compare the right and the left thumbs NGR. ANOVA test was used to compare group means for NGR.

Correlation analysis was used to check for relations between age, NGR and other variables.

p- value less than 0.05 was considered significant.

Results:

The NGR was measured in a total of 106 subjects. The subjects were divided into 3 groups:

Group1 (Smoker male subjects): Twenty three subjects were included in this group. Their ages ranged between 20 and 52 years with a mean of 35.87 years + 11.72 years. Group 2 (Non-smoker male subjects):A total of 34 subjects were included. Their ages ranged between 13 and 52 years with a mean of 31.76 years + 10.16 years. Group 3 (Non-smoker female subjects):A total of 49 subjects were included. Their ages ranged between 8 and 58 years with a mean of 27.49 years + 11.66 years. The subjects were allocated to age groups as follows. Group 1: two subjects were in their second decade, 6 subjects were in their third decade, 8 were in their fourth decade, 3 were in their fifth decade and 4 were in their sixth decade of life. Group 2: eight subjects were in their second decade, 4 were in their third, 17 were in their fourth, 4 were in their fifth and one was in his sixth decade of life. Group 3: Three subjects were in their first decade, 16 subjects were in their second decade, 8 were in their third, 17 were in their fourth, 4 were in their fifth and one was in her sixth decade of life. In group 1 (smokers): The NGR was calculated in 21 right thumbs and 23 left thumbs. The mean growth rate in the right thumb was 95.4 microns/day + 28.8 microns/day (S.D). The minimum was 40 microns/day and the maximum was 150 microns/day .(Table 1) While the mean growth rate in the left thumb of the same group was 96 microns /day + 34 microns/day. The minimum was 40 microns/day and the maximum was 160 microns/day. (Table 1)

Table 1: Growth rate of right and left thumbs in smoker males.

	Left thumb		Right thumb	
	mm/day	micron/day	mm/day	micron/day
Mean	0.0954	95.4	0.0969	96.9
SD	0.0288	28.8	0.03403	34.03
Minimum	0.04	40	0.04	40
Maximum	0.15	150	0.16	160

In group 2 (Non-smoker males) the NGR was calculated in 32 right thumbs and 34 left thumbs.

The right thumb growth rate was 105.6 microns/day + 34.35 microns/day. The minimum was 50 microns/day and the maximum was 200 microns/day. (Table 2) While the left

thumb growth rate was in the same group 103.4 microns /day + 34.24 microns /day. The minimum was 30 microns /day and the maximum was 190 microns /day.(table 2)

Table 2: Growth rate of right and left thumbs in non-smoker males.

	Left thumb		Right thumb	
	mm/day	micron/day	mm/day	micron/day
Mean	0.1056	105.6	0.1034	103.4
SD	0.03435	34.35	0.03424	34.24
Minimum	0.05	50	0.03	30
Maximum	0.20	200	0.19	190

In group 3 (non-smoker females) the NGR was calculated in 44 right thumbs and 49 left thumbs. The right thumb growth rate was 100 .5 microns /day + 33.52 microns/day. The minimum was 40 microns /day and the maximum was 180 microns / day. While the left thumb growth rate in the same group was 101.6 microns /day + 31.77 microns /day. The minimum was 30 microns /day and the maximum was 160 microns /day. (table3).

Table 3: Growth rate of right and left thumbs in non-smoker females.

	Left thumb		Right thumb	
	mm/day	micron/day	mm/day	micron/day
Mean	0.1005	100.5	0.1016	101.6
SD	0.03352	33.52	0.03177	31.77
Minimum	0.04	40	0.03	30
Maximum	0.18	180	0.16	160

There was no statistical difference between right and left growth rate in all groups. Comparing the NGR of the right and the left thumbs of smokers with the corresponding NGR in non-smoker male subjects revealed that the nail growth in smokers was less than that in non-smokers in both the right and the left thumbs although the difference did not reach statistical significance. Comparing the NGR of the right and the left thumbs in male non-smokers with female non- smokers did reveal statistical significant differences. A significant correlation between growth rate of the right and left thumb was demonstrated in all groups. Age is inversely correlated with nail growth in right and left thumbs in all groups (smokers, non-smoker males, non-smoker females), but the correlations did not reach statistical significance except with the right thumb NGR in non-smoker males in whom it reached statistical significance. The duration of smoking was inversely related to nail growth, but it did not reach statistical significance. The number of cigarettes smoked

per day and NGR in smokers. This is also inversely related to nail growth, but also did not reach statistical significance. The effect of age on NGR was further examined by dividing the subjects into age groups and determining the NGR. The NGR tends to be higher in the 20 -29 and 30 -39 age groups than the other age groups, but this is not consistent in all subject group tested. (table 4, 5)

Table 4: Mean growth rate of right thumb in microns from subjects in the three groups according to age. Mean growth rate in micron/day

Age in years	Group 1(male smokers)	Group 2 (male non-smokers)	Group 3 (female non-smokers)
1-9			96
10-19		153.3	116.2
20-29	91.8	121.7	95.16
30-39	95.6	100.9	97.06
40-49	106	64.3	95
>49	89.5	108.5	64

Table 5: Mean growth rate of left thumb in microns from subjects in the three groups according to age. Mean growth rate in micron/day

Age in years	Group 1(male smokers)	Group 2 (non-smoker males)	Group 3(non-smoker females)
1-9			57.5
10-19		107	119.69
20-29	99	122.5	107.36
30-39	91.8	100.2	95.65
40-49	109	86	91.6
>49	86.8	101.5	50

Discussion:

Comparing the NGR of the right and the left thumbs of smokers with the corresponding NGR in non-smoker male subjects revealed that the nail growth in smokers was less than that in non-smokers in both the right and the left thumbs although the difference did not reach statistical significance. Al-Khafaji and Sharquie (4) found that the NGR in smokers was slightly higher than non-smokers, 100 microns per day for smokers and 95 microns/ day for non-smokers, although this difference did not reach statistical significance group. In the present study age is inversely correlated with nail growth in the right and the left thumbs in all groups. However they did not reach statistical

significance except in the right thumb of non-smoker males. The reason for not reaching statistical significance may be related to several factors for example the number of subjects in certain age groups was small. In accordance with our results Singh et al (5) demonstrated that the linear NGR slows by 50% during the life span of humans. Another study showed a decline in NGR in animals by Williams et al (6). This decline may represent a biological fact as indicated by the decrease rate of regeneration in the various organs of the body.

Orentreich et al (7) carried a study on a relatively large number of volunteers aged from 10 to 100 years and demonstrated that the rate of finger nail growth increased until well into the third decade of life. Thereafter a steady decrease of nail growth was noticed in the following years.

References

- 1- Tosti A & Piraccini BM. *Biology of nails and nail disorders*. In: *Fitzaptrics Dermatology in General Medicine*. Edited by: Wolff K, Goldsmith LA, Katz SI, Gilchrest BA, Paller AS & Leffell DJ. (2008) Seventh edition. McGraw Hill Medical New York. Chapter 87 PP: 778-781.
- 2- Bean WB. *Nail growth: 30 years of observations*. *Arch Intern Med* 1974; 134: 497-502.
- 3- Galosi A, Plewig G & Braun-Falco O. *The effect of aromatic retinoid Ro 10-9359 (etretinate) on fingernail growth*. *Arch Dermatol Res*. 1985; 277:138-40
- 4- AL-Khafaji F and Sharquie K. *Linear nail growth of the left hand*. *J Fac Med (Baghdad)* 2000;42: 113-21
- 5- Singh G, Haneef NS and Uday A. *Nail changes and disorders among the elderly*. *Indian J Dermatol Venereol Leprol* 2005; 71:386-92.
- 6- Williams DD, Short R, Bowden DM. *Fingernail growth rate as a biomarker of aging in the pigtailed macaque (Macaca nemestrina)*. *Exp Gerontol* 1990;25:423-32.
- 7- Orentreich N, Markofsky J and Vogelmann JH. *The effect of aging on the rate of linear nail growth*. *J Invest Dermatol* 1979;73: 126-130.