

Study On Nail Fate In Normal Healthy Individuals; By Taking Serial Photographs Of Nails Of Indelible Election Ink Mark.

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Abstract

Context:

Indelible election ink on left Index fingernail is marker of a person who has casted a vote, during the election. Disappearance of this ink mark from the nail and also from the skin can be considered as a surrogate marker of growth of nail and skin tissue.

Aims: To find out fate of nail growth by observing disappearance of indelible election ink mark.

Settings and Designs: This longitudinal Study was carried out at the time of 50th legislative assembly election which was held on December 1 and 5 2022 in Gujarat, India

Methods

Participants were asked to send a digital photograph of finger nail on the day of election, another photograph when the election ink mark disappeared. Data of 100 compliant participants were analysed.

Results:

Of 100 participants, 48 were male and 52 were female. On an average, ink mark disappeared after 55 ± 24.63 days. There was no significant difference in disappearance of ink mark in relation to age, however in participants above the age of 60 years, had disappearance of ink mark at mean 73.3 days, maximum of 100 days. Sub group analysis by Scatter plot, showed linear relation between age and election ink mark disappearance, especially in the group of "males below 30" and also in "females above 30."

Conclusion:

Election ink mark disappearances can give idea of nail growth and it can be used as a potential tool for research purpose both in normal physiological conditions as well as in many systemic illnesses.

Key words

- Nail growth
- Election ink
- Nail fate
- Nail mark

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I. Introduction:

In India, Indelible election ink is used over left Index fingernail to mark the person who have casted their voting right during the election. The purpose of this procedure is to prevent duplication of voting. Generally, with the election ink, a purple/red/blue coloured line is made by election booth officer from the skin, cuticle of the nail and reaching up to two thirds of nail surface [1]. (Refer Illustration 1). There are two parts of election ink stain; the one which is on the skin and other one on the nail. The part of election ink stain on skin stays for 72–96 hours while it will stay on the cuticle area of the nail for 2 to 4 weeks. It is reported that it may take up to 4 months (120 days) for the mark to remain on the nail which is replaced completely by new nail growth [2].




		
<p>Image 1A, taken just after the election ink mark was applied. This image gives original colour of blue/red/violet which may change to dark brown after the exposure to ultraviolet rays in sunlight [2].</p>	<p>Image 1B, the official applies the election ink starting from the skin below the nail which disappears within 72-96 hours [2]. However, it remains on the nail for longer time. This implies that the skin tissue growth is faster than the nail.</p>	<p>Image 1C, the election ink may spread around the adjacent nail borders. As it is present on the skin, it disappears earlier when compared to the nail. Also shown here is the difference in development of colour on skin and nail, thus suggesting different fate of the election ink on the nail and skin tissue.</p>

Illustration No. 1.A, B and C, Photographs of election ink stains on the skin and on the nail of left Index finger, of three different participants (on the day of election).

Electoral ink contains silver nitrate medically used as an anti-septic and for wound cauterization [3]. This ink marks skin and the nail with colour which may change because of the exposure to ultraviolet rays in sunlight. This leaves a permanent mark that is impossible to wash off and is only removed as external skin cells and nails are replaced [2,3].

This indelible ink, also known as electoral ink, remains up to several weeks on the nail of the index finger which is the evidence that one has exercised their democratic rights and voted. It is generally considered safe, however rarely it may cause the problem of cutaneous burns [4].

The ink mark applied during election can be used as a tool to study the nail growth [5]. Like Abraham A, Roga G and Thomas N [5], we used this tool to find out of nail growth in local Gujarati Indian population. We have taken serial photographs of ink marking to see the behaviour of nail growth.

We have hypothesized that if nail growth of all individuals is same then electoral ink-lie should disappear at the same time in all the individuals. We also wanted to study fate of the nail cells over days such that whether it has any age, gender or other factor influences.

II. Material and Methods:

In Gujarat (India), 15th Legislative Assembly election was held on December 1 and 5, 2022. One hundred and Eleven voters from Vadodara and Ahmadabad showed their willingness to participate in this study, of which the data of 100 compliant participants were analysed. All the participants agreed to send nail photographs and data through e-mail, WhatsApp (online messenger application) or by other social media platforms. Participants were asked to send a digital photograph of the left index finger nail on the day of election, another photograph at the end when the election ink mark disappeared and at least one photograph in between from the day of election to the day when it disappeared from the part of the nail which is attached to skin (sensitive part of the nail). More photographs were welcomed [Image 2A, B and C].

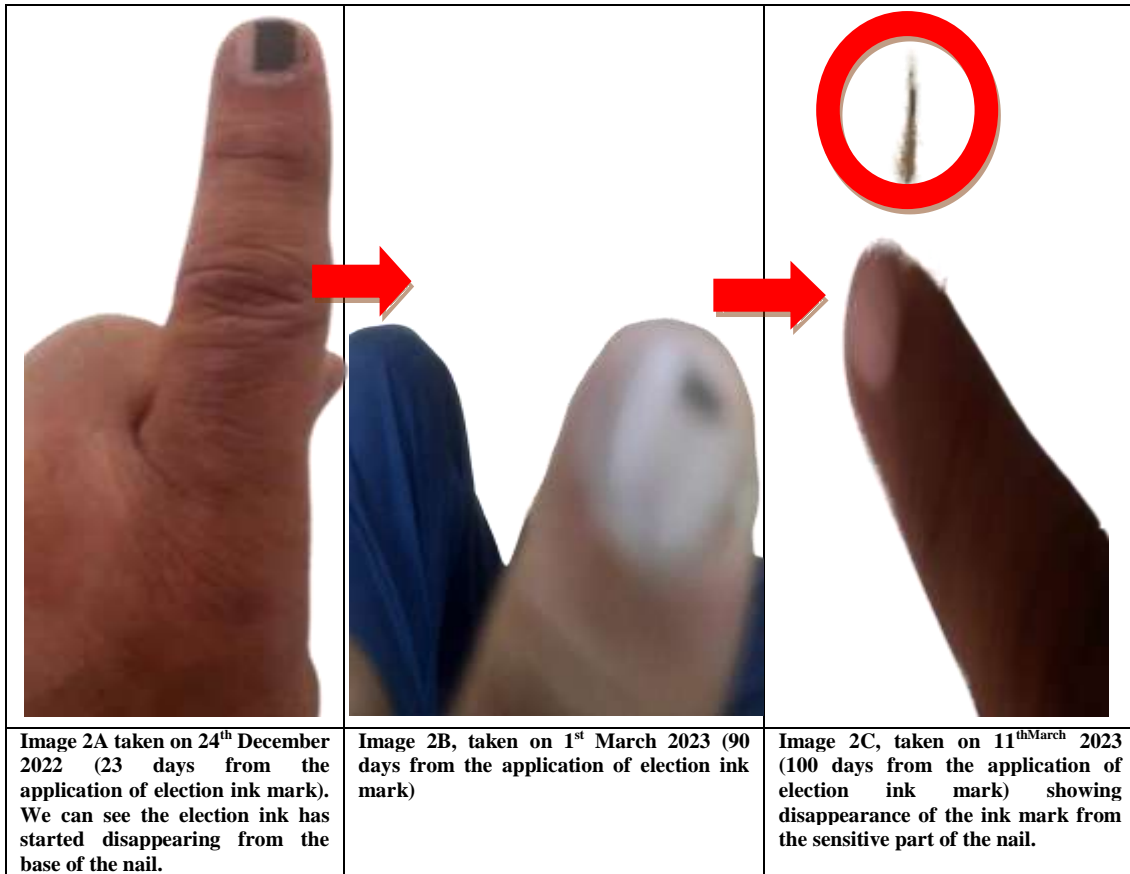


Image 2A, 2B and 2C of one of the participants (Age: 70 years, Male) illustrating different stages of electoral ink disappearance from the nail.

III. Results:

As shown in table 1, out of 100 participants, 48 were male and 52 were female. On an average, in the study group, ink mark disappeared after 55 days ± 24.63 days.

To make to two equal groups for the study the participants were divided as 18-30 years and >30 years. Out of 100 participants 47 (22 males and 25 females) belonged to the age group of 18-30 years. In this group the average days of disappearance of the ink mark was 55.7 days. Out of 100 participants, 53 participants belonged to the age group of >30 years (26 males and 27 females). In this group the average days of disappearance of the ink mark was 54.57 days. As far as mean disappearance of ink-mark in both these groups are concerned, it was almost same in both these groups.

For sub analysis, the group 2 (above the age of 30 years, was subdivided into ages 31-40 years having 16 participants (9 males and 7 females) were ink mark disappeared in mean 52.5 days in 41-50 years group which had 12 participants (5 males and 7 females) it disappeared in 43 days and in 51-60 years age group having 16 participants (6 males and 10 females) it disappeared in 54.9 days. In the group above >60 years having 9 participants (6 males and 3 females), it disappeared in 73.3 days though it is observed that >60 years group it disappeared after longer time than other age group subjects, result was not statistically significant. (Table 1)

Table 1: Show gender and age distribution of the participants with average duration in days for disappearance of election ink mark.

Age Group	Total Number Of Male Participants (N=48)	Average Age Of Male Participants	Average Days For Disappearance Of Ink Marks In Males	Total Number Of Female Participants (N=52)	Average Age Of Female Participants	Average Days For Disappearance In Females	Average Days For Disappearance In All Subjects (N=100)
18-30 (N=47)	22	27.04	55.7	25	25.84	53.2	55.7
31-40 (N=16)	09	34.89	52.0	07	35.86	53.6	52.5

41-50 (N=12)	05	46.20	46.7	07	45.89	43	43
51-60 (N=15)	06	57.00	54.9	10	56.70	63.5	54.9
>60 (N=9)	06	65.83	73.3	03	65.67	76.3	73.3

As previous, few, observational study and anecdotal reports on nail growth showed decrease in nail growth on advancement of the age, we wanted to confirm this finding. We also hypothesized in this study that with increase in age the rate of somatic tissue growth decreases. However, as shown in table 1, it did not show statistically significant difference. As there was some subtle difference which was noted in gross data of both these groups; in relation to age as well as gender, we plotted scatter plot, gender wise and age wise.

Figure 1 (A to E) shows scatter plot of age versus days of presence of Ink mark, graphically presented. Age and gender wise differences of nail ink-mark disappearance were noted. It was equated with new nail replacement in a given individual. Figure 1A shows that in males of age group 18-30, there was positive linear co-relation between increase in age with increase in days for disappearance of election mark. In males above 30, graph showed more or less, a straight horizontal line suggesting no difference. In females, growth of the nail showed more difference in the group above the age of 30 years, though it is seen in age group of below 30 also, in a lesser magnitude (lesser slope of the graph). The scatter plot of all 100 subjects are plotted in graph 1E, which also shows a linear relation between age and nail growth.

IV. Discussion:

Many researchers have tried to document rate of nail growth. The technique used by them differs but one fact which emerges out of the nail growth studies is that the growth of nail is very slow [6]. We used election ink disappearance as a marker for nail growth. We also found that disappearance of election ink of the nail was very slow and it took on an average 55 days below the age of 60 years and almost 73 days in subjects above 60 years. The election ink disappeared very fast from the skin adjacent to the nail.

The growth of the nail may vary as per age. In fact, Orentreich N, Markofsky J, Vogelman JH suggested that linear nail growth rate can be used as a tool to measure the process of aging. It can be one of the noninvasive methods to assess biological function of whole body which ages with the nail. Thus it can be one of the indexes of aging [7].

Growth of nail decreases as the age advances. It was one of the evidences provided by one of the researcher workers, Bean W B, who reported his observations of 30 years. He observed growth of his own left thumb nail by continuous observations [8]. Decrease in nail growth rate was not noted in our case series; however, the scatter plot showed that as age advances the nail growth decreases. One of the participants of 70 years, otherwise healthy; had disappearance of ink mark after 100 days. (Image 2 A, B, C)

A self-report from Bean W B is one of the initial researches on nail growth suggesting two important facts. The first one being that nail grows very slowly and the second one that as the age advances the nail growth decreases. He observed nail to grow from cuticle to tip. It took 116 days to grow over the distance of 1.45 cm of nail length, at the 31, increased to 148 days at 61. In 30 years, the reduction in growth rate from 0.125 mm a day to 0.1 mm a day [8] In our study it was election ink mark which we observed from cuticle to tip, which gives very similar information. The difference was that we observed left index finger while his observation was on left thumb.

Difference of rate of growth can be different in different fingers. It was documented that middle finger nails grow fastest. The index and ring finger nails grow faster than those of the thumb and little finger. Toe nail grows slowly than finger nails. It is postulated that rate of nail growth is proportional to length of fingers. [9]

Nail can be considered to be mirror for systemic illness [10]. Thus, trying to understand nail growth in normal person, especially normal variation can give better insight in relating many nail abnormalities to systemic disorders

In this study, we found that females above the age of 30 years had more linear relation to increase in age. Thus, hormone may be playing part in the growth of nails in females, like there is difference in the skin and hairs in females. As the scatter plot shows, in males it was more related in age group of 18 to 30 while in females it was the age group of 30 and above.

Election ink on the nail can give an estimate of nail growth in the normal subjects. This pilot work can be extended to a larger group as huge data may be available at the time of election. In normal person also, there was marked variation in nail growth as noted in this study. We studied age and gender mainly but other normal physiological factors like metabolic rate, ethnic group, BMI, diet and other factors may be playing part which can be studied.

Though nail and skin, both are tissue developed from ectoderm both behaves differently as far as tissue fate and growth is concerned. Nail can be considered a pandora box for research in normal as well as in patients having diseases.

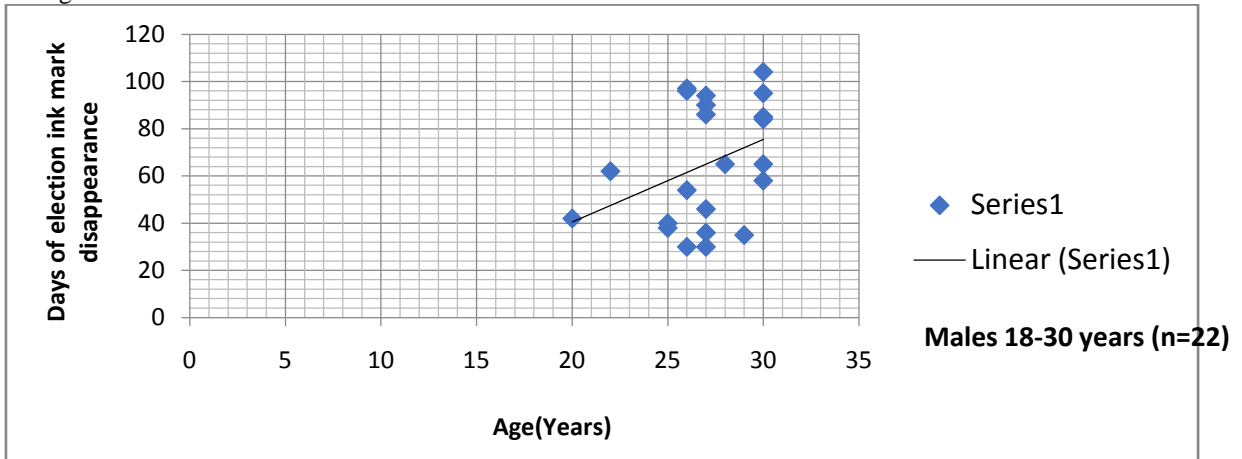


Figure 1, Scatter plot of “age” on X-axis versus “D ay of disappearance of election ink mark “ on Y-axis of group of males aged 18 to 30 years.

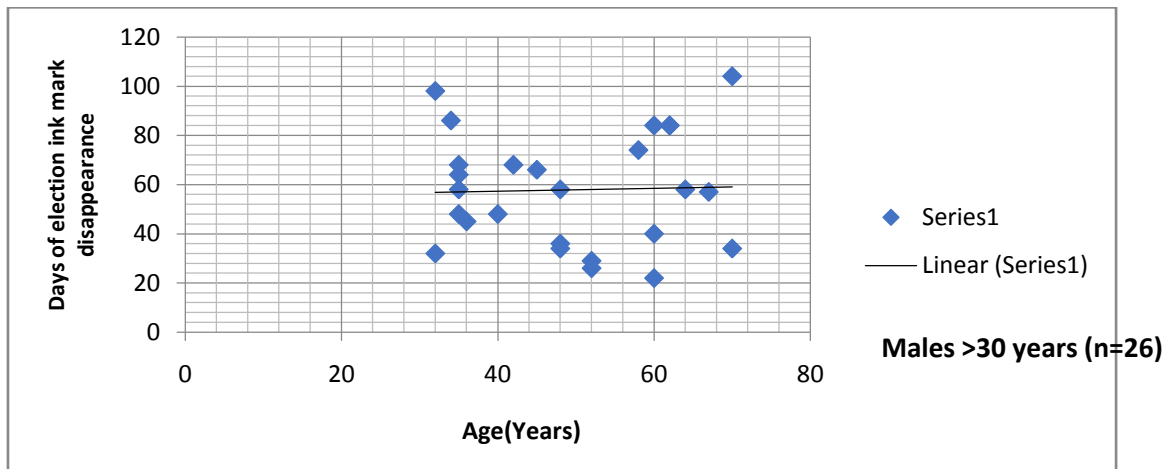


Figure 2, Scatter plot of age on X-axis versus day of disappearance of election ink mark on Y-axis of group of males > 30 years.

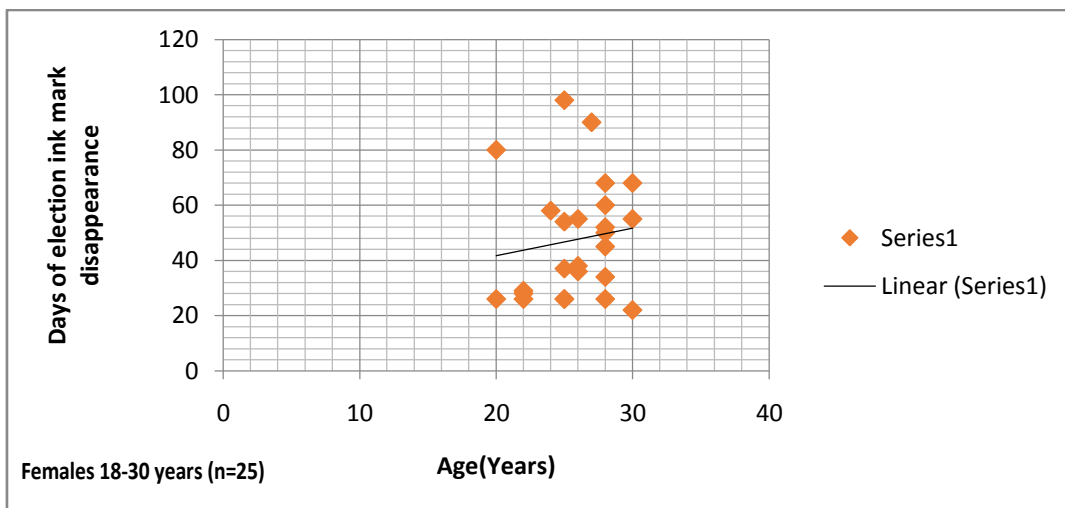


Figure 3, Scatter plot of age on X-axis versus day of disappearance of election ink mark on Y-axis of group of Females aged 18 to 30 years.

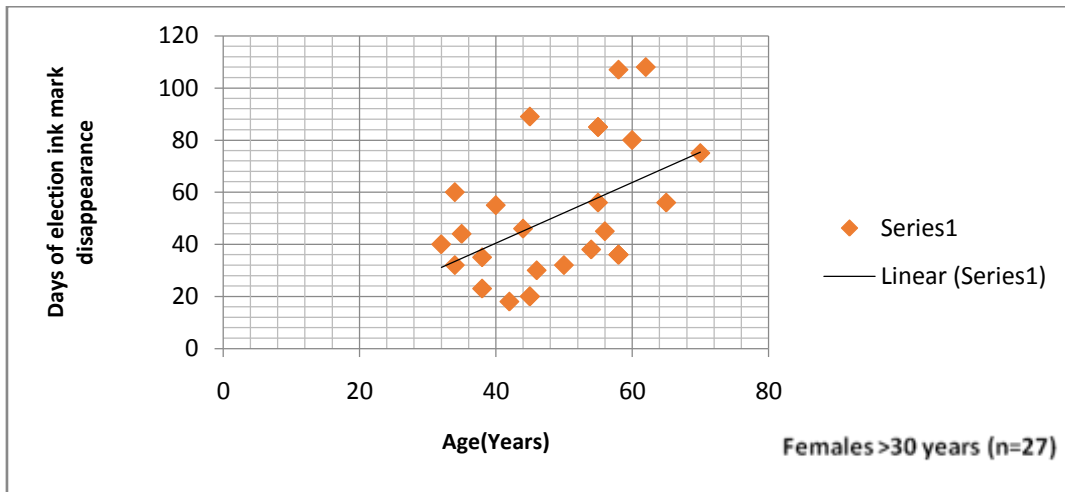


Figure 4, Scatter plot of age on X-axis versus day of disappearance of election ink mark on Y-axis of group of Females > 30 years.

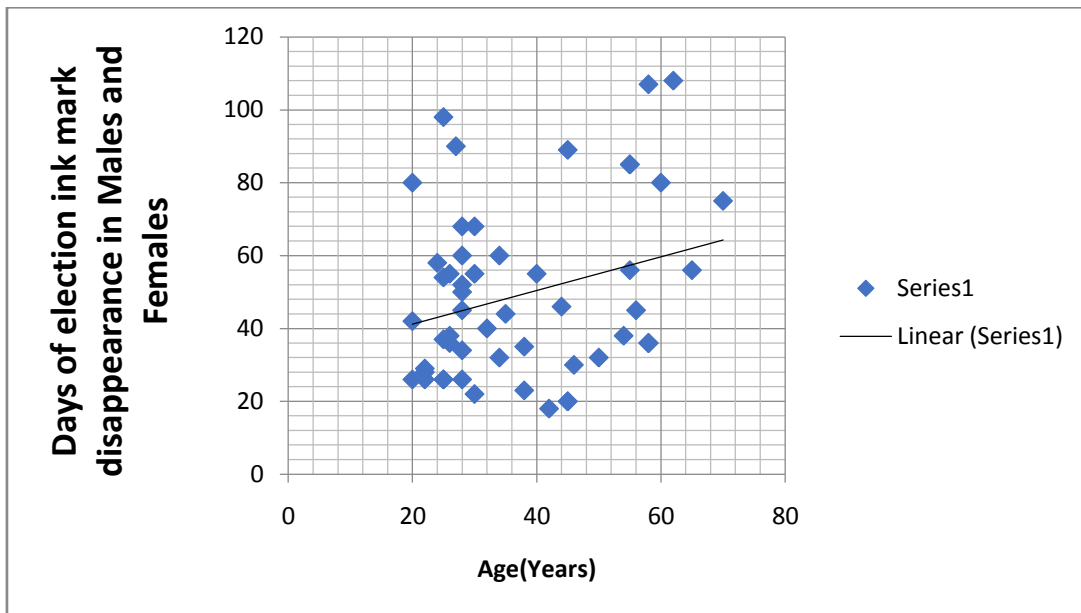


Figure 5, Scatter plot showing disappearance of election ink mark in days on X-axis and age on Y-axis, of all 100 participants.

Limitation of the study:

This was a pilot work and was with only 100 subjects. More numbers of participants in various age strata could have given better idea and insight. Again, other factors which affect nail growth should have been included.

V. Conclusion:

Election ink mark disappearances can give idea of nail growth and it can be used as a potential tool for research purpose both in normal physiological conditions as well as in many systemic illnesses. Nail grows very slowly in comparison with the skin. Age, gender and some other unidentifiable factors may be playing part ill nail fate, their growth and replacement.

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