

*Does everyone have common finger  
print patterns among their ten fingers?*

**Science Fair Project Report**

*Level : Middle Level*

*Category : Life Science*

**Submitted by**

**ABDUL HARIS. S**

*(Grade 7)*

**ARRAHMAAN INTERNATIONAL SCHOOL**

*(Creating the community of Excellence)*



# *Does everyone have common finger print patterns among their ten fingers?*

## **CONTENTS**

<b>Chapter No</b>	<b>Title</b>	<b>Page NO</b>
1	Abstract	1
2	Introduction	2
3	Statement Of the Problem	4
4	Hypothesis	4
5	Design Of Study	5
6	Collections of Data	8
7	Results	11
8	Discussion	11
9	Application	13
10	Conclusion	14
11	Future Enhancement	14
12	Acknowledgement	15
13	Reference	16

### **ABSTRACT**

For my project “Does everyone have common finger print patterns among their ten fingers?”, I selected 20 persons from different family and then asked each person to roll his or her ten fingers on the inkpad, then roll the inked fingers onto the boxes in survey form which I prepared for my project, one by one. I observed keenly the fingerprint patterns in the survey form using the magnifying lens and found that, “No ten fingerprints are ever exactly alike in every person. Also this project leads to various observation and findings. Among the twenty subjects, the ulnar loop pattern of finger print was found as the most common pattern.

## INTRODUCTION

Fingerprints have been the gold standard for personal identification within the forensic community for more than one hundred years. Fingerprints and finger marks combine to provide the most powerful means of personal identification. Do you ever notice how ridges flow up and down all over the surface making it a kind of pattern? This is the amazing fingerprint! Every Fingerprint is unique and has been considered as the best privacy hack one can have. It is best used to lock/unlock your phone as it's the first gateway to your smartphone and having it will make it very secure as our unique fingerprint will always ensure that it's unlocked just by us! The recovery of fingerprints from a crime scene is an important method of forensic science. The bumpy ridges on the tips of our fingers are an evolutionary mystery.

The human's fingerprints form from the 13th to 19th week of embryo's stage. The finger prints are not common among all people. There are three major types in finger prints (loop, whorl, arch).The loop having two types (ulnar, radial).the arch also having two types (plain arch, tented arch).And the whorl having four types (plain whorl, double loop whorl, central pocket loop whorl, accidental whorl). About 60 to 65 percent of the populations have loop patterns, 30 to 35 percent have whorls, and only about 5 percent have arches.



## FINGERPRINT PATTERNS AND CLASSIFICATIONS



**Plain Arch**

In plain arches the ridges enter on one side of the impression and flow or tend to flow out the other side with a rise or wave in the center.



**Tented Arch**

Tented arches are similar to plain arches with the exception that the ridges in the center form an upthrust; or they approach the loop type of pattern, possessing two of the basic characteristics of the loop, but lacking the third.



**Ulnar Loop**

Ulnar loops are those types of pattern in which the loops flow in the direction of the little fingers.

The above pattern would be an ulnar pattern if on the right hand, and a radial pattern if on the left hand. The above pattern is also sometimes called a right slant loop, regardless of which hand it appears on.



**Radial Loop**

Radial loops are those types of pattern in which the loops flow in the direction of the thumbs.

The above pattern would be a radial pattern if on the right hand, and an ulnar pattern if on the left hand.

The above pattern is also sometimes called a left slant loop, regardless of which hand it appears on.



**Double Loop Whorl**

The double loop whorl consists of two separate loop formations, with two separate and distinct sets of shoulders and two deltas.



**Plain Whorl**

A plain whorl has two deltas and at least one ridge making a complete circuit, which may be spiral, oval, or any variant of the circle. An imaginary line drawn between the two deltas must touch or cross at least one of the recurring ridges within the pattern area.



**Central Pocket Loop Whorl**

The central pocket loop whorl consists of one or more recurring ridges, or an obstruction at a right angle to the inner line of flow, with two deltas between which an imaginary line would cut or touch no recurring ridge within the pattern area. The inner line of flow of a central pocket loop whorl is determined by drawing an imaginary line between the inner delta and the center of the innermost recurve or looping ridge.



**Accidental Whorl**

The accidental whorl is a pattern with two or more deltas, and a combination of two or more different types of patterns exclusive of the plain arch. This classification also includes those exceedingly unusual patterns which may not be placed by definition into any other classes.

Above fingerprint images from *The Science of Fingerprints - Classification and Uses*, by the FBI Identification Division, 1957.

### **STATEMENT OF THE PROBLEM**

My father has a mobile phone in which he used the fingerprint as screen lock. My father usually uses his thumb finger print to open his phone. Once he used his index finger but it not opened. It shows error message.

I know that finger prints are unique among humans but after seeing that I doubted whether the finger prints are unique among ten fingers of a same human or not. I saw in my hand there are many ridges, some fingers print patterns are same but some are not same.

So I decided to do a research on the finger print on the topic, *“Does everyone have common fingerprint patterns among their ten fingers?”*

### **HYPOTHESIS**

*The fingerprint patterns are not common among the ten fingers of a same person.*

## DESIGN OF STUDY

### *INDEPENDENT VARIABLE:*

- Human beings

### *DEPENDENT VARIABLE:*

- Types of finger print

### *CONTROLLED VARIABLES:*

- Ink

### *MATERIALS:*

- Survey form
- Pencil
- Ink pad
- Disposable wipes
- Magnifying glass

*PROCEDURE:*

In this investigation, the fingerprint patterns among the ten fingers of a same person are tested for resemblance.

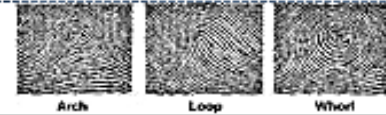
- Gather the necessary materials.
- Determine twenty subjects of different families for this investigation.
- Prepare a survey form which has ten boxes.
- Have each subject roll his or her fingers on the ink pad and then roll the inked fingers onto the boxes in survey form one by one. Be sure to write the subject's name on the form. Provide the subject with a disposable wipe to clean his or her finger.
- Once all the fingerprints have been collected, examine the prints using a magnifying glass.
- Categorize each print as whorl (plain whorl, double loop whorl, central pocket loop, accidental whorl), arch (plain, tented) or loop (ulnar, radial).
- Draw conclusions from the data collected.



Survey form to collect the data



**ARRAHMAAN INTERNATIONAL SCHOOL**  
**FINGER PRINT SURVEY – NATIONAL SCIENCE FAIR PROJECT**  
*Does everyone have common fingerprint patterns among their ten fingers?*



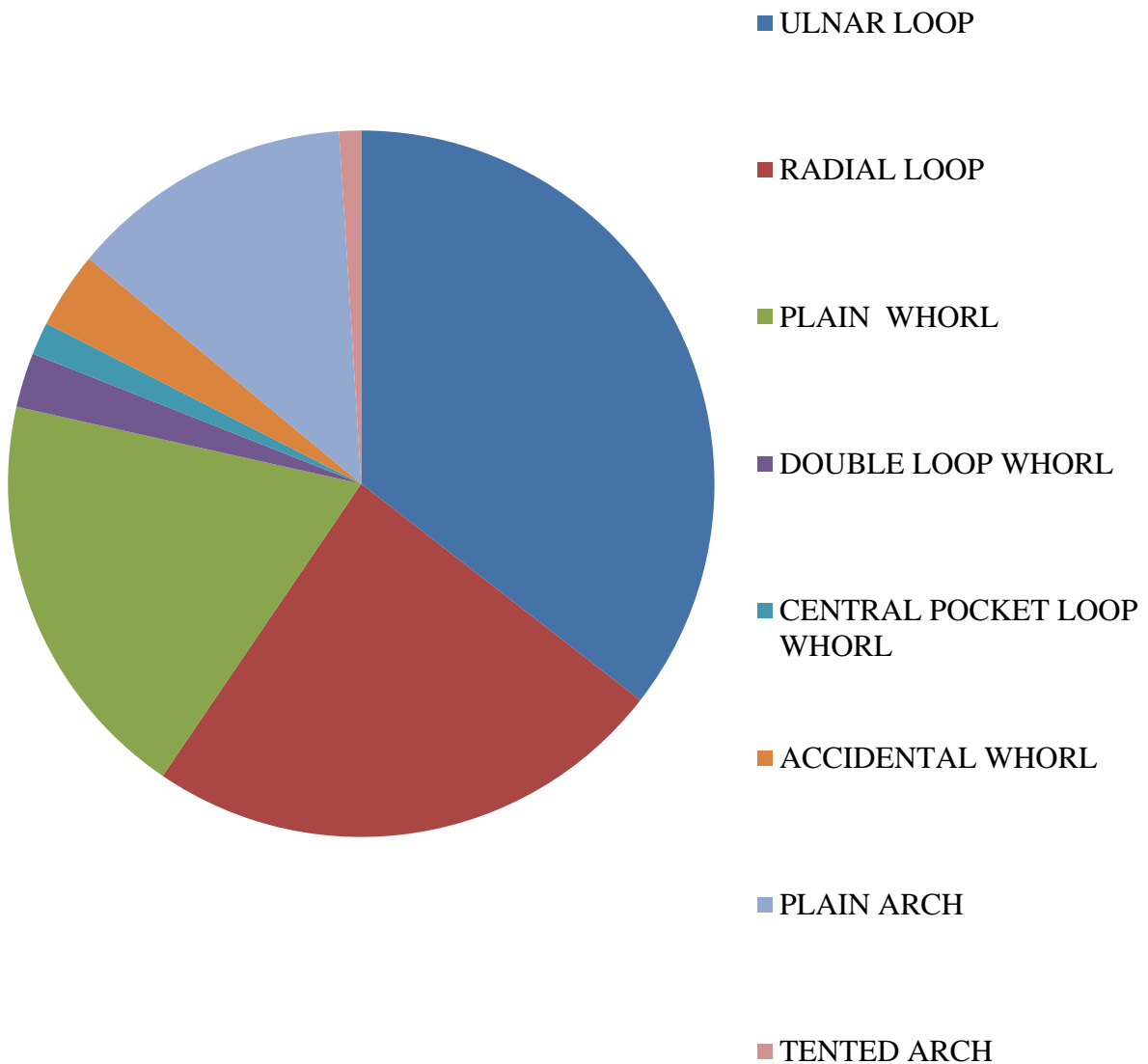
Name of the person:					Report		
Finger name	Right Finger Impression	Finger Print Type	Left Finger Impression	Finger print type	<ul style="list-style-type: none"> <li>▪ _____ type of Finger print is found in common.</li> <li>▪ _____ type of Finger print is found common in left hand.</li> <li>▪ _____ type of Finger print is found common in right hand.</li> <li>▪ _____ percentage of resemblance seen among the _____ type of finger print.</li> <li>▪ <u>Other Comments:</u></li> </ul> <p align="right">Survey by: S. Abdul Haris (Grade 7)</p>		
Thumb finger							
Index finger							
Middle finger							
Ring finger							
Little finger							
Loop		Whorl				Arch	
Ulnar loop	Radial loop	Plain whorl	Double loop whorl	Central Pocket loop whorl	Accidental whorl	Plain arch	Tented arch

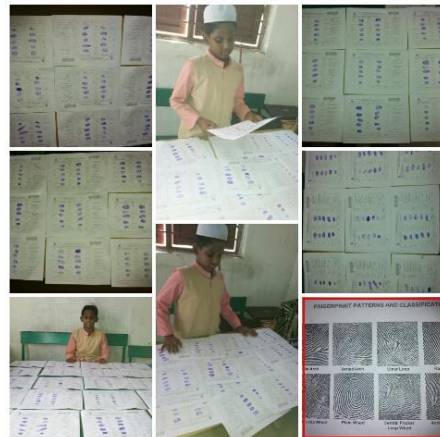
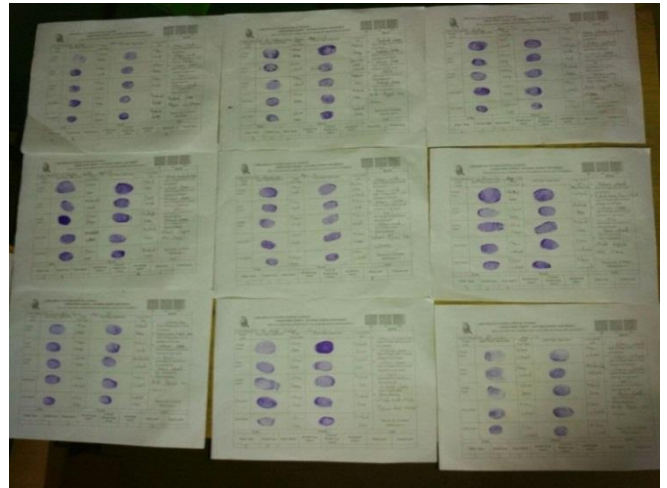
**COLLECTION OF DATA**

**Data Collected from 20 persons (200 fingers)**

	<b>Loop</b>		<b>Whorl</b>				<b>Arch</b>	
	<b>Ulnar loop</b>	<b>Radial loop</b>	<b>Plain whorl</b>	<b>Double loop whorl</b>	<b>Central Pocket loop whorl</b>	<b>Accidental whorl</b>	<b>Plain arch</b>	<b>Tented arch</b>
<b>No of fingers having this fingerprint pattern</b>	<b>71</b>	<b>48</b>	<b>38</b>	<b>5</b>	<b>3</b>	<b>7</b>	<b>26</b>	<b>2</b>
<b>Percentage of fingerprint pattern out of two hundred fingers</b>	<b>35.5</b>	<b>24</b>	<b>19</b>	<b>2.5</b>	<b>1.5</b>	<b>3.5</b>	<b>13</b>	<b>1</b>

## PERCENTAGE OF FINGER PRINT TYPES OBSERVED AMONG THE TWENTY PERSONS





## **RESULT**

- After the survey I found that the ulnar loop (35.5%) is the most common type of fingerprint pattern and tented arc (1%) is the least common type.
- Next to the ulnar loop, radial loop (24%) stands second common type.
- In the whorl fingerprint pattern, the plain whorl is commonly found and in arch type, the plain arch is common and all the other types of whorl and arc are rare.
- It is interesting to observe the different finger print patterns of the ten fingers of a same person. Some prints were difficult to "read", while others were clear and obvious.
- Among the eight types of fingerprint pattern, in the ten fingers of a same person I found maximum of four types.

## **DISCUSSION**

- I read that the loop is most common in the world but through my research, I observed that the ulnar loop is most common. These are named after a bone in the forearm called ulna. This bone is on the same side as the little finger and the flow of this pattern runs from the thumb towards the little finger of the hand.
- Next to the ulnar loop the radial loop stands second: The radial loops are named after a bone in the forearm known as radius that joins the hand on the same side as the thumb. The flow of these loops runs in the direction of the radius bone i.e. the downward slope of the radial loop is from the little finger towards the thumb of the hand. These loops are not very common and most of the times will be found on the index fingers.
- Tented arch is least common type and it is only 1%. The similarity between this pattern and the plain arch is that it starts on one side of the finger and flows out to the other side in a similar pattern. However, the difference is that the tented arch lies in the ridges in the

centre and is not continuous like the plain arch. They have significant up thrusts in the ridges near the middle that arrange themselves on both sides of an axis. The adjoining ridges converge towards this axis and thus appear to form tents.

- Plain whorl is third common type and it is 19% , double loop is 2.5%, accidental is 3.5% and the plain arch is 13%. These type of finger prints present only in one or two fingers of a person and even not found in any person.
- And central pocket loop whorl is 1.5%.It is very rare among the 20 subjects.
- Also I have noticed the fingerprints on my palm. Loops are usually found on the area of the palm between the fingers. The one between the ring finger and pinky is commonly called the 'ulnar loop' and between the ring and middle fingers is called the 'loop of seriousness'. A loop between the index and middle fingers is quite rare, and is a sign of royal lineage in Indian traditional palmistry. Some people also have loops or arches elsewhere, most commonly in the area around the base of the thumb. It is also quite common to have a loop on the side of the palm opposite the thumb. A whorl print is very rare anywhere on the palm also.

## APPLICATION

Everyone person has a unique set of fingerprints. Fingerprints are made up of a combination of loops, whorls, and arches.

*Fingerprints can be used in all sorts of ways:*

- Crime investigators use fingerprints to help solve crimes.
- Fingerprints are also used for other identification purposes. Providing biometric security (for example, to control access to secure areas or systems)
- Identifying amnesia victims and unknown deceased (such as victims of major disasters, if their fingerprints are on file)
- Conducting background checks (including applications for government employment, defense security clearance, concealed weapon permits, etc.).

Every Fingerprint is unique and has been considered as the best privacy hack one can have. It is best used to lock/unlock your phone as it's the first gateway to your smartphone and having it will make it very secure as our unique fingerprint will always ensure that it's unlocked just by us!

### **CONCLUSION**

- My hypothesis, “the fingerprint patterns are not common among the ten fingers of a same person” has been proved.
- No ten fingers are common and an interesting fact I observed was even both the thumbs, index fingers, middle fingers, ring fingers and little fingers of both the hands are not common for a person.

### **FUTURE ENHANCEMENT**

I want to continue my experiment by researching whether the environment conditions affect the fingerprints. I hope this will be useful in crime investigation.



### **ACKNOWLEDGEMENT**

In a warm- hearted state and with intense pleasure, I bow myself and adore the ALMIGHTY for his grace and immeasurable blessings showered upon me all throughout my life.

Knowledge in itself is a continuous process. I would have never succeeded in completing my task without the cooperation, encouragement and help provided to us by various personalities. With deep sense of gratitude we express our sincere thanks to my esteemed and worthy Mrs. M.Taj Nisha M,Sc, B.Ed, BA, my Science Teacher for her valuable guidance, effective supervision, encouragement and cooperation in carrying out this work.

I wish to express my sincere thanks to our school management Principal Mrs.A.Parakath Nisha, Correspondent Mr.A. Sathakkathullah and admin people and respective teachers and care takers in my school. And special thanks to Mrs. R.Sameem M,Sc, B.Ed, PGDCA, my Academic Co-coordinator for her full co-operation and help. The technical guidance and constant encouragement made it possible to tie over the numerous problems, which so ever came up during the study.

Our school coworkers encourage me to take up this challenge and provided me with useful tips to help, write the final report in the correct format. My parents provided emotional support throughout the project. Last but not the least, our sincere thanks to all of our friends who have patiently extended all sorts of help in this project.

## **REFERENCE**

- <http://www.childidprogram.com/>
- <https://www.scientificamerican.com/article/are-ones-fingerprints-sim/>
- <https://www.scientificamerican.com/article/succession-science-are-fingerprint-patterns-inherited/>
- <https://www.scientificamerican.com/article/succession-science-are-fingerprint-patterns-inherited/>
- <https://owlcation.com/humanities/fingerprinting>
- <https://www.omicsonline.org/human-identification-and-fingerprints-a-review-2155-6180.1000123.php?aid=2581>
- <https://study.com/academy/lesson/fingerprint-science-fair-project-ideas.html>
- <https://www.education.com/science-fair/article/fingerprint-findings/>
- <http://www.touchngoid.com/8-common-fingerprint-patterns/>
- <http://onin.com/fp/fphistory.html>