

# Experimental and Regression Analysis on Human Hair Fibered Concrete

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DOI: <https://doi.org/10.26438/ijcse/v7i2.102105> | Available online at: [www.ijcseonline.org](http://www.ijcseonline.org)

Accepted: 16/Feb/2019, Published: 28/Feb/2019

**Abstract**— Everywhere throughout the world part of waste materials is making issue as far as contamination and different issues. So is the human hair, hairdressers trim the hair of individuals and discard in sewage channels or some stream or in open, this straightforwardly influences human solace by blocking channel pipes or making contamination of land or water and even in some cases amid blowing air causes air contamination too. To acquire this waste material into utilization this examination the human hair is included in conventional concrete with no substitution. Five distinct rates of human hair by weight of cement are utilized. Human hair is effectively accessible wherever free of cost henceforth not any more additional expense is used. Human hair utilized in the concrete was right off the bat cleaned by evacuating additional rubbish and was then washed in a container utilizing cleanser at that point dried and utilized in concrete. We as a whole realize that the concrete is good in compression and weak in tension and the beneficial thing on utilizing hair in cement is that, on investigations it was discovered that the compressive quality of the solid increments on expanding the level of human hair and it was additionally discovered that the rigidity of the mortar increments by including human hair in cement. Furthermore regression examination was done on the outcomes got to fine the numerical condition which can be utilized in future to know the quality.

**Keywords**— Waste material, human hair, compressive strength, tensile strength, regression analysis.

## I. INTRODUCTION

We directed an unpleasant overview among the specialists of excellence parlors and cantinas about the transfer of hair waste and lion's share of them concurred that there is no successful strategy for the transfer of non bio degradable hair with the goal that they have been disposing of it as such[1]. Fiber is a little bit of fortifying material having certain attributes. The fiber is constantly depicted by fitting parameters, called angle proportion. The perspective proportion of the fiber is the proportion of its length to its width. Run of the mill perspective proportion shifts from 30 to 150 [2]. Jain D. what's more, Kothari A [3] directed research on Hair Fiber fortified solid which was utilized as a strengthening material for cement in fluctuating rate (0%, 1%, 1.5%) and found that supplanting 1.5% HHF made the solid to achieve crest quality. Riya Babu M, Neena Rose Davis [4] examinations uncovered that on expansion of changing rate (0%, 1.5%, 2%) of HHF to the solid supplanting 2% of HHF expanded the quality. Dr. R.C.Reddy and Shweta kaushik [5] clarified that supplanting 1.5% HHF as fortification in cement brought about pinnacle compressive quality. Vinayak Awasare, Prof. M. V. Nagendra [6] supplanted GGBS as a coupling material in the solid. This new kind of cement having short discrete filaments spread toward all path is alluded as fiber fortified cement (FRC) [7]. Strands can be diminished penetrability of concrete just as seeping of water [8]. Strands interlink and

capture around the total particles and blending of these are progressively durable so that diminish the functionality [9]. Once in a while strands go about as support in non-basic inside [10]. Filaments in solid control the splits because of plastic shrinkage and to drying shrinkage [11]. Human hair is solid in pressure with the goal that it utilized as fiber fortified material [12].

## II. MATERIALS USED AND METHODOLOGY

Fundamental development materials cement, sand, coarse aggregates and water were utilized in this investigation, notwithstanding these materials human hair (Fig. 1) was additionally utilized. Every one of the materials utilized was tested by the rules given by Indian standard codes and was discovered fit for use. The human hair utilized was cleaned washed and dries and after that utilized in cement.



Fig. 1: Human hair to be used in concrete

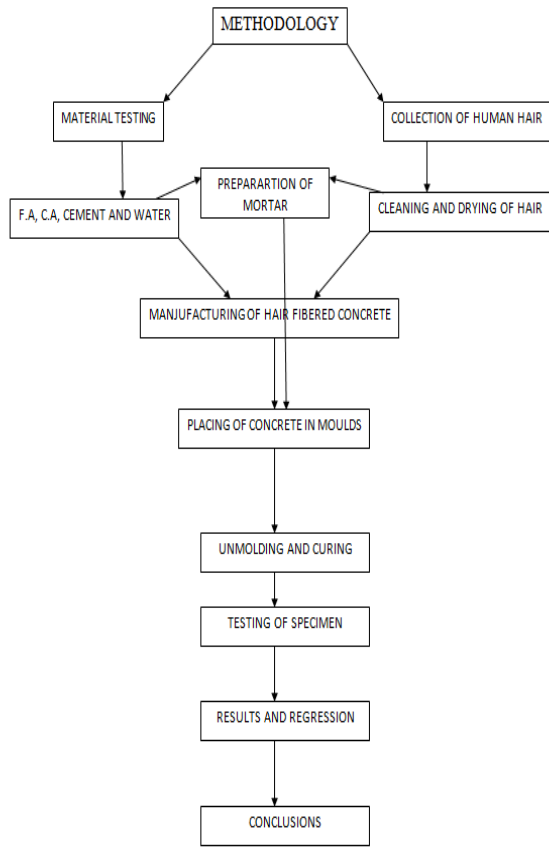


Fig. 3: briquette testing machine to determine the tensile strength of mortar.

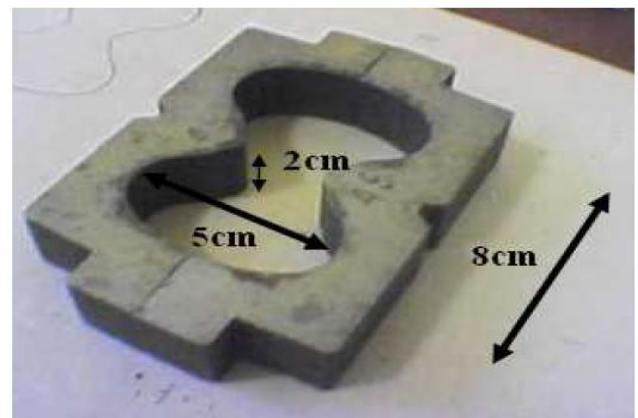


Fig. 4: Briquette moulds for casting briquettes.

Absolute two kinds of example was threw one to discover the impact of human hair on compressive quality and another to discover the impact of human hair on elasticity of cement. To decide the compressive quality solid blocks of measurements 150mm each was cast and tried under CTM (Fig. 2). To decide the elasticity of solid mortar briquettes was cast and was tried for rigidity. Every one of the outcomes got from the hair fibered concrete was contrasted and the regular cement of blend M20. To analyze the rigidity, briquette testing machine (Fig. 3) was utilized and concretes mortar briquettes (Fig. 4) of same blend without incorporation of human hair was utilized for examination.



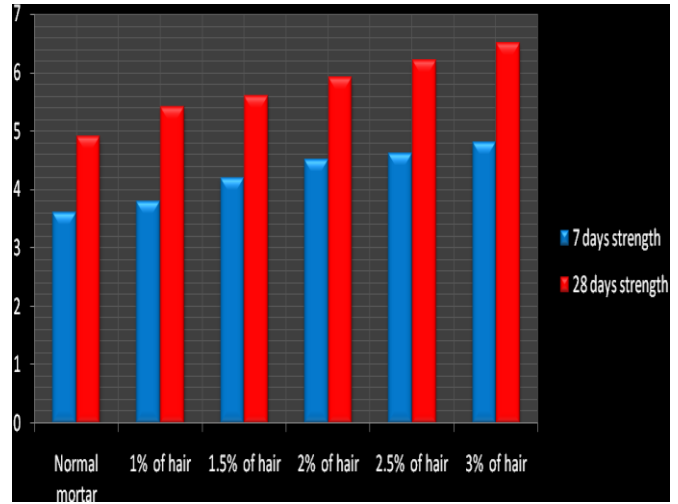
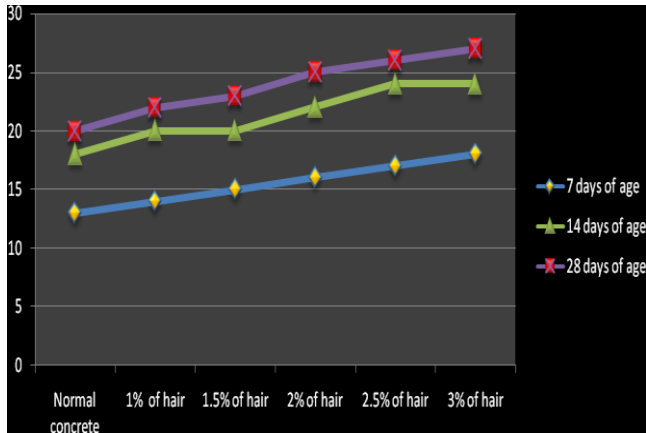
Fig. 2: compressive strength testing machine

### III. RESULTS

While testing these samples it was found that there is reduction in cracking of concrete. All the results are obtained by testing of minimum 3 samples for each value and taking average of three. The samples were tested on 7<sup>th</sup>, 14<sup>th</sup> and 28<sup>th</sup> days of age.

Table 1

Compressive strength of (Mpa)	Normal concrete	1% of hair	1.5% of hair	2% of hair	2.5% of hair	3% of hair
7 days of age	13	14	15	16	17	18
14 days of age	18	20	20	22	24	24
28 days of age	20	22	23	25	26	27



REGRESSION EQUATION:

$$\text{COMPRESSIVE STRENGTH} = 10.03 + 0.3776 \text{ AGE IN DAYS} + 2.333 \text{ \%GE OF HUMAN HAIR}$$

$$\text{TENSILE STRENGTH} = 2.8267 + 0.07333 \text{ AGE IN DAYS} + 0.5200 \text{ \%GE OF HAIR}$$

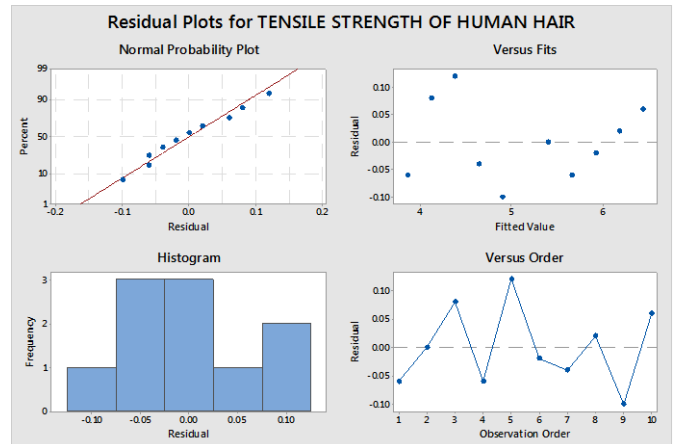
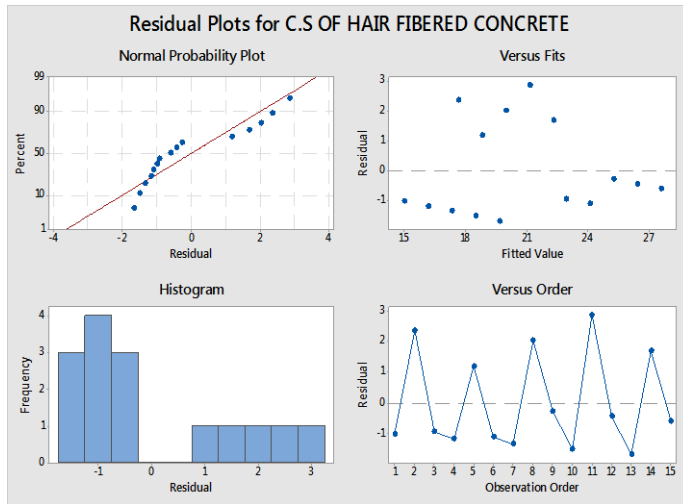


Table 2 Tensile strength test was carried out using briquette testing machine

Tensile strength (Mpa)	Normal mortar	1% of hair	1.5% of hair	2% of hair	2.5% of hair	3% of hair
7 days strength	3.6	3.8	4.2	4.5	4.6	4.8
28 days strength	4.9	5.4	5.6	5.9	6.2	6.5

#### IV. CONCLUSIONS

From the test examinations it tends to be inferred that because of the expansion of human hair in solid it upgrades the compressive quality as well as builds the rigidity other than because of the consideration of human hair in solid contamination brought about by hair can be decreased to some degree. On expanding the level of hair in concrete the compressive quality gets expanded comparably on expanding the level of hair in cement rigidity additionally gets expanded as it goes about as a fiber inside cement. At last the regression conditions were acquired from the outcomes which will help in future to get the ideal estimation of solidarity with no experimentation.

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## Authors Profile

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