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OPTIMUM UTILIZATION OF HUMAN HAIR IN CONCRETE AS A PARTIAL REPLACEMENT OF CEMENT

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Abstract: This study presents the human hair is a strong in tension & used fiber reinforcement materials. It's very cheap cost concrete as one of the mostly widely used building material. It is adding of both cement & human hair to reinforcement concrete in M20 grade concrete. Fiber reinforced concrete is one among those advancement which offer a convenient particle and economical method. Studies have been under taken to analyses the effect of human hair on plain cement concrete on the basis of compressive, crushing, and flexural strength and crawling control to economize method. Human hair percentage is 0 to 3% by weight of cement and for each % of human hair added in concrete 12 cubes were tested for their respectively mechanical properties of caring periods 7days, 14days and 28days. The combustion of human hair create unpleasant odour & produces hazardous gases like ammonia, sulphides, hydrogen sulphide, sulphur dioxide etc. The reuse of human hair shows that it gives more compressive strength as compared to normal or ideal concrete. The study of human hair fiber is incorporated into concrete. In this practical the results showed that there is an increment in the various mechanical properties and strength of concrete by adding of human hairs to concrete. The concrete mix for sustainable construction practices.

Keywords:- Human Hair, fiber reinforced concrete, Compressive Strength

I. INTRODUCTION

Concrete is the most commonly used construction material in a civil engineering because high structural strength stability. The natural resources are deceases and also the cost of natural sand and cement are increases. The concrete plays very important role in developing the infrastructures like highway, building, town and bridges etc. The concrete is a mixture of cement, sand, coarse aggregates and water. Human hairs are made up by human being. Human hair has about 65%-95% of its weight is proteins, more than 32% of water, liquid pigments and other components. They made it by processing of chemical synthesis. The human hair fiber control the crack because of drying and plastic shrinkage. The hair fiber is low at cost and its forms in huge quantity. In this study the effect of RHA as a partial cement replacing material with the addition of human hair fiber were carried out. The experiments were conducted on concrete cubes, beams and cylinder of standard sizes. The investigations experimental outcomes indicate that using human hair as fiber enhance the better bounding between the research we used naturally available human hair fiber in to overcome this environmental issue in this study an attempt is made to use. An alternate non-degradable matter, is available in abundance and at a very cheap cost. Experiments were conduct on concrete cubes with various percentages of human hair fiber. This investigations experimental outcomes indicate that using human hair as a fiber enhances the better bonding between. In this research, the authors used naturally available human hair as a fiber in to overcome this environmental issue, in this study.

II. MATERIALS

2.1.Cement: The Portland cement of 43 grade is used in this experimental investigation.

TABLE 2.1.1.PROPERTIES OF CEMENT

Sr.No.	Property	Value
1	Specific gravity	3.23
2	Initial setting time	44 Minutes
3	Final setting time	245Minutes
4	Standard consistency	28.70 %
5	Fineness	98.52

2.1.2.Coarse aggregate: The coarse aggregate used for the current study are the crushed one and angular in shape. Here also the coarse aggregate is washed to remove any kind of dirt or impurity present. The size of aggregate used here is 20mm, 16mm and 12mm having a specific gravity of 2.74 coarse aggregate particles used here are the one which retained on is sieve no. 480(4.75mm)

2.1.3.Fine Aggregate: Clean river sand is used as fine aggregate. The size of it is less than 2.36mm. The percentage of passing is within the limit as per IS: 383-1970. Water absorption for fine aggregate=0.2

2.1.4.Human Hair: Human hair have been used as fiber here and they have been washed as well after collection to remove any undesirable impurity present and after washing. Hairs are properly dried either under sun or in oven and preferable should be sorted such as they have uniform length so as to maintain and have an even and equal distribution of hairs while mixing concrete. After drying hair can be stored without any issue of odour or decay. Human hair was used to partially replace by a cement for making concrete specimen.

TABLE 2.1.4.PROPERTIES OF HUMAN HAIR

Sr. No	Properties	Value
1.	Cross section	Circular
2.	Diameter	18-100micronm
3.	Elongation	1.6times its dry length
4.	Length	6-50mm

2.1.5Water : The water used for mixing and curing of concrete specimen is as per IS: 456-2000. The study has been carried in the concrete technology laboratory of civil engineering department ,Nagpur Institute of Technology, Nagpur(Maharashtra), India.

III. RESULTS AND DISCUSSION

3.1.1.MIX DESIGN:

Mixed design is carried out as per Indian Standard code method (IS: 10262-2009) for concreting the test specimen. The grade of concrete which we adopted is M20 with the water cement ratio of 0.45

3.1.2.WORKABILITY TEST:

Workability is a property of raw or fresh concrete mixture. In simple words, workability means the ease of placement and workable concrete means the concrete which can be placed and can be compacted easily without any segregation.
Concrete slump test or slump cone test is to determine the workability or consistency of concrete mix prepared at the laboratory or the construction site during the progress of the work. Concrete slump test is carried out from batch to batch to check the uniform quality of concrete during construction. The slump test is the most simple workability test for concrete, involves low cost and provides immediate results. Due to this fact, it has been widely used for workability tests since 1922. The slump is carried out as per procedures mentioned in ASTM C143 in the United States, IS: 1199 – 1959 in India and EN 12350-2 in Europe. Generally concrete slump value is used to find the workability, which indicates water-cement ratio, but there are various factors including properties of materials, mixing methods, dosage, admixtures etc. also affect the concrete slump value.

TABLE 3.1.2. SLUMP VALUE OF CONCRETE

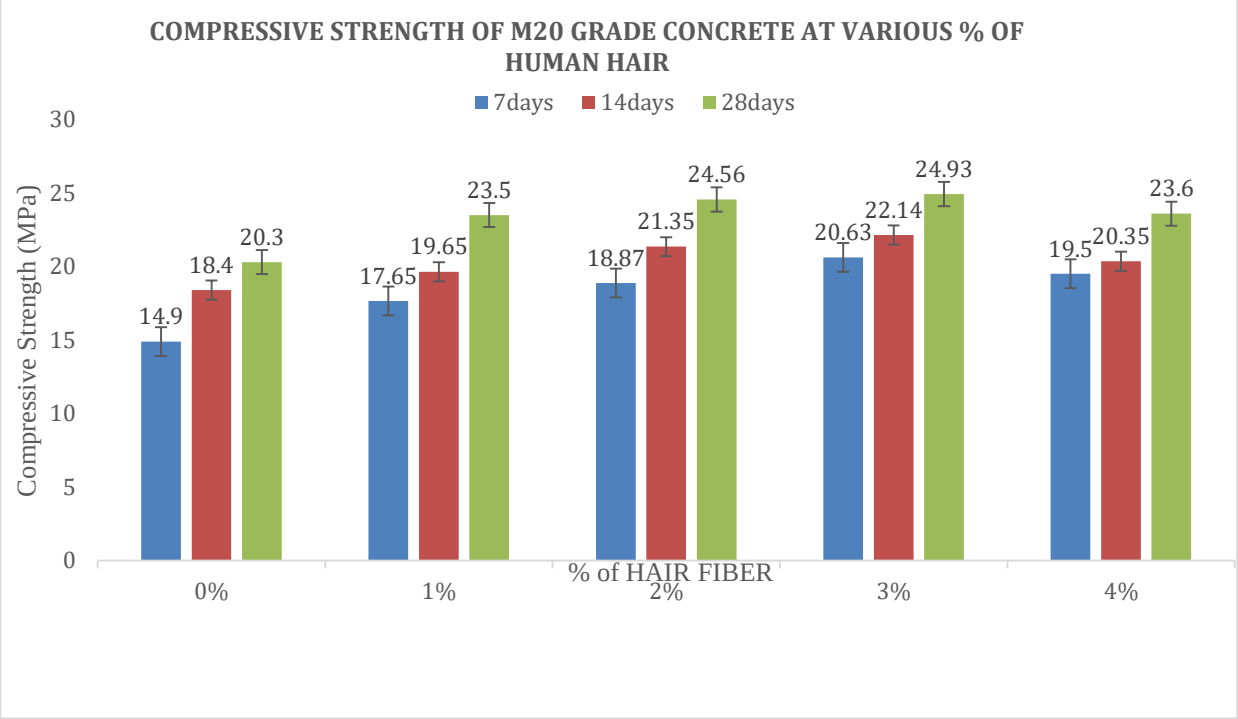
Grade	Water-cement ratio	Initial height (mm)	Final height (mm)	Value of Slump
M_{20}	0.5	300	273	27

3.1.3.COMPRESSION STRENGTH TEST:

The compressive strength of concrete is determined in batching plant laboratories for every batch in order to maintain the desired quality of concrete during casting. The strength of concrete is required to calculate the strength of the members. Concrete specimens are a cast and tested under the action of compressive loads to determine the strength of concrete. In very simple words, compressive strength is calculated by dividing the failure load with the area of application of load, usually after 28 days of curing. The strength of concrete is controlled by the proportioning of cement, coarse and fine aggregates, water, and various admixtures. The ratio of the water to cement is the chief factor for determining concrete strength. The lower the water-cement ratio, the higher is the compressive strength. Average 28 days compressive strength of at least three 150 mm concrete cubes prepared with water proposed to be used shall not be less than 90% of average of strength of three similar concrete cubes prepared with distilled water. For quality control in case of mass concreting, the frequency of testing of compressive strength by cube test
As per Indian standard concrete cube of size 150X150X150mm was casted and curing was done for 7days 14days and 28days, Test were performed by using compressive strength testing machine. The percentage of human hair were taken as 0%, 1%, 2%,3% and 4%. Three cubes of each percentage of human hair are casted. After the test results were taken are shown in below tabular form.

TABLE 3.1.3.COMPRESSIVE STRENGTH OF CONCRETE

Sr. No.	No. of Days	Percentage of hair	Compressive strength (MPa)
1	7days	0%	14.9
2	14days	0%	18.4
3	28days	0%	22.30
4	7days	1%	17.65
5	14days	1%	19.65
6	28days	1%	23.50
7	7days	2%	18.87
8	14days	2%	21.35
9	28days	2%	24.56
10	7days	3%	20.63
11	14days	3%	22.14
12	28days	3%	24.93
13	7 days	4%	19.50
14	14 days	4%	20.35
15	21 days	4%	23.60



IV. CONCLUSION

The wastage of human hair from salons, temple etc. can be reuses properly and used as a fibre material. It has been observed on testing for compressive strength the FRC shows less formation of cracks. Increase in strength is observed 3% hair used in concrete among will get of cubes. Use of FRC being hair a fibre can be used in construction in seismic zone, human hair increases compressive strength and improve binding properties in materials as well as formation of cracks is reduced. According totally laboratory test performed observed thee increased in properties of concrete as per % of hairs by weight of concrete. When M20 concrete with 0%, 1%, 2% ,3 % and 4% of addition hair compared with the normal cement concrete its gives Increment in Comprehensive strength. Finally it concluded that the 3%addition of hair is gives more comprehensive strength as compared to normal concrete. strength and durability tests were conducted on hair fiber reinforced concrete. FRC show very less formation of cracks. Human hair increase compressive strength as well as improve binding property of concrete. Large amount of hair cause environmental risk. Due to its non degradable characteristics. These biological waste are efficiently utilized in fiber reinforced concrete for greener and cost effective material. The most promising end use areas of cement based one or civil constant in seismic zone. FRC is lighter in weight as well as more workable concrete is weak in tension but human hair strong in tension. Human hair are most preferred reinforcement material in structure increase property of concrete and tensile strength also.

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