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ANALYSIS OF PROPERTIES OF CONCRETE USING HUMAN HAIR LENGTH GREATER THAN 10CENTIMETER DIPPED IN SALT WATER AS FIBER REINFORCEMNT ADMIXTURE

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Abstract

Admixtures now days play a predominant role in concrete manufacturing. The admixtures ranged from blood in history to fiber reinforcement admixture. In this paper the author analyzing the properties of concrete using salt water cured and oven dried human hair whose length exceeding 10cm as fiber reinforced admixture is studied and verified by strength of ordinary Portland cement without using any admixture. Using human hair length greater than 10cm as fiber reinforcement admixture gave good percentage of increment in compressive strength and flexural strength, but as the length of the human hair increases used for concrete as fiber reinforcement admixture reduces the strength.

Keywords: Hair Fiber Reinforced Admixture; Compressive Strength; Flexural Strength; Grade of Concrete.

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1. Introduction

Human hair is extremely strong. The organization of keratin within its cortex allows it to resist a strain of up to hundred grams. A lock of 100 hairs can thus withstand a weight of 10 kilograms. As to the average head of hair, it could withstand 12tons, if the scalp were strong enough. For lengthening of up to 5% hair is elastic.

This is due to structure of the keratin molecules, called keratin A in its natural state, stretching arranges it into keratin B. Beyond that, keratin B begins to resist. However, in this phase before breaking, the hair can still be elongated and it often breaks only after its length has actually doubled.

Human hair is a material considered useless in most societies and therefore is found in municipal waste stream in almost all cities and towns of the world [1]. In 2010, India alone exported approximately 1 million kg of human hair and its products worth US $ 238 million, and total global imports were valued at US $ 1.24 billion [2]. Due to hair dust and decaying hair, workers of many hair-processing units in India have increased cases of tuberculosis and respiratory tract infections [3, 4]. The trait determined by the hair follicle volume & the condition of strand.

Fine hair has smallest circumference, coarse hair has the largest circumference, and medium hair is anywhere between the other two coarse hair has a more open cuticle than thin or medium hair causing it to be the most porous [5].

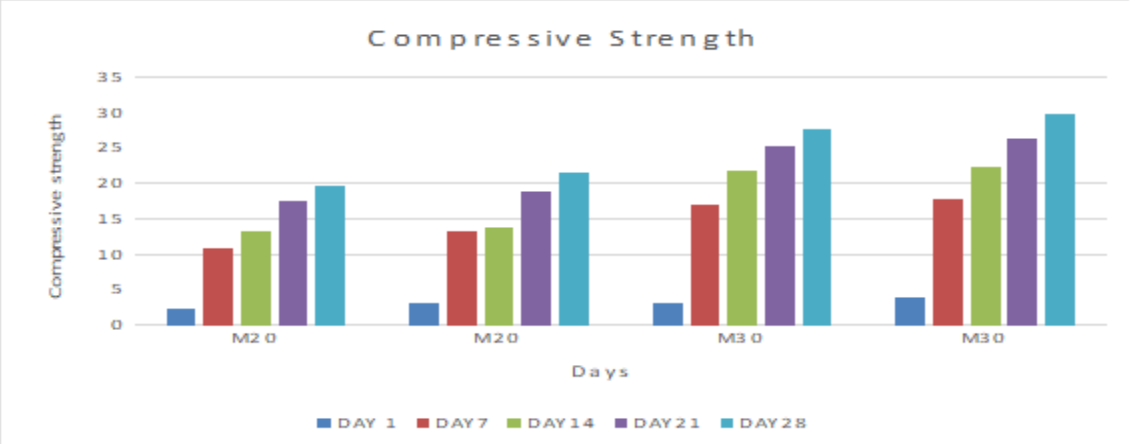
Dipping the human hair in salt water increases the surface tension of hair, hence gives greater bond strength as author used the hair as a fiber reinforced admixture. As it is oven dried there will be no chance of bio-degradation.

The author has experimented by dipping hair in salt water to increase its surface tension and bonding strength of admixture to experience different results as he used hair length less than & greater than 5cm. but in the present study author has used hair having length greater than 10cm.

2. Methodology

The human hair length greater than 10cm were collected from different sources and they were dipped into salt water in the ratio of 35grams per litre of water. The hairs have been dipped for 2days to make hair surface rough and it helps in good bond strength with concrete. The salt water soaked hair kept for drying under sunlight for one day. The hairs have been oven dried for 2 to 3 hours before mixing it into concrete. This oven drying helps in removal of water and helps in non biodegradation of hair.

3. Results and Discussions



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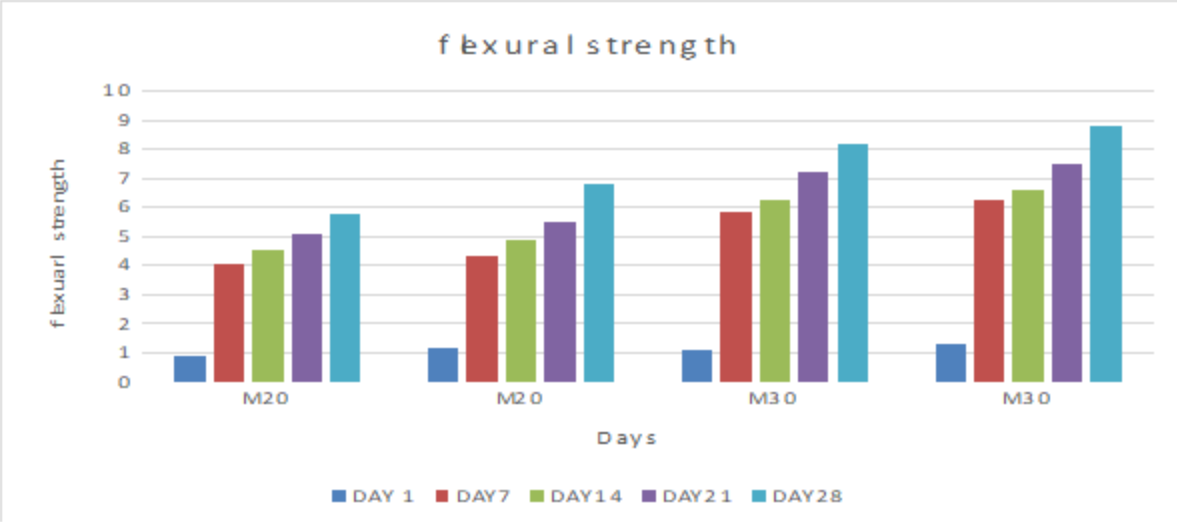

4. Conclusions & Recommendations

From fig(1), it can be observed that M20 grade concrete with hair as admixture greater than 10cm length withstands less compressive strength 21.53 compared to the hair as admixture using hairs of length greater than 5cm 22.1.This clearly states that approximately 0.5MPa of compression withstanding capacity has decreased.

In fig (2) shows, flexural strength than can be withstand by human hair as fiber reinforcement concrete greater than 10cm length, present study reveals that using human hair greater than 10cm as fiber reinforcement admixture takes 6.79MPa comparatively to using human hair greater than 5cm as using human hair greater than 5cm as fiber reinforcement admixture 7.04MPa, that is approximately 0.25MPa decrement in flexural strength in M20 grade of concrete.

Hence it says that the compressive strength &flexural strength goes on decreases as increasing the length of human hair dipped in salt water and oven dried used as fiber reinforcement admixture.

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