



## Study And Analysis Of Self Curing Concrete Using Millenium 21

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**Abstract:** Concrete is a composite material composed of cement, fine and coarse aggregate and water that hardens over time. When aggregate is mixed with dry Portland cement and water, the mixture forms a fluid slurry that is easily poured and molded into required shape. The cement reacts with the water and other ingredients to form a hard matrix that binds the materials together into a durable stone-like material that has many uses. Hydration is a chemical reaction in which the major compounds in cement form chemical bonds with water molecules and become hydration products. The hydration is exothermic reaction and it is necessary to keep surface cool for gaining of strength in concrete. Concrete curing is the process of maintaining adequate moisture in concrete within a proper temperature range in order to aid cement hydration at early ages. Millenium21 is a new admixture product in market and is used as internal curing compound in this experimental study. In this experimental study the effects of Millenium21 were studied on strength with different dosage of admixture.

**IndexTerms – concrete, internal curing , fluid cement, aggregate, hydration, millenium21**

### I. INTRODUCTION

Curing has a strong influence on all properties of concrete and therefore it should not be taken granted. Properly cured concrete has better surface hardness and can better withstand surface wear and abrasion. Proper curing helps to prevent grazing, dusting, surface disintegration and scaling. Adequate curing reduces shrinkage, gives better resistance to wear and improves long-term appearance. Curing also makes concrete more impermeable, which prevents moisture and water-borne chemicals from entering into the concrete, thereby increasing durability and service life. To have a dense microstructure and impermeability, prolonged curing is a must which leads to enhanced durability. Well-designed concrete may give poor durability if not properly cured and on the other hand a moderately designed concrete if well cured can give a better durability. Hence importance of curing should never be ignored.

### II. NEED & SIGNIFICANCE OF SELF CURING CONCRETE

Due to contraction happening throughout cement hydration, vacant pores are formed inside cement paste, most important to a diminish in its interior relative dampness and also to contraction which may reason early-age crack. The strength achieved by internal curing might be additional than that probable under soaked curing circumstances.

When mineral admixtures rely entirely in a combine cement structure, their order for curing water can be a lot better than that in a conservative ordinary cement concrete. Due to chemical contraction taking place throughout cement hydration, vacant pores are created inside the cement adhesive, chief to a decrease in its inner relative dampness and to contraction which can reason early-age cracking.

### III. OBJECTIVES OF PROJECT

- To establish the effectiveness of MILLENIUM 21 (Polycarboxylate Ether Based) as internal curing compound concrete.
- To determine the effectiveness of Millenium 21, the scope of the project is outlined as follows:
- To determine compressive strength (since most of the mechanical properties of concrete are dependent on its compressive strength) of M20 grade concrete using Millenium 21 (for various dosages viz. 100, 150 and 200mL/50 kg of cement) and without using Millenium 21 for age maturity of 7, 14, 21, 28 days.

#### IV. Experimental Investigation

The experimental program was designed to investigate the compressive strength of concrete at the age of for 7, 14, 21 and 28 days by adding Millenium-21 at dosages of 100, 150, 200ml/50kg cement. In this investigation cube compressive strength of conventionally cured compared with internal cured concrete. For this experimental program mixes of M20 Grade concrete was considered. IS 10262-2019 code procedure was adopted to design M20 grade concrete.

#### V. MATERIALS

##### 5.1 Cement

Ordinary Portland cement of 43 grade was used throughout the entire program.

##### 5.2 Coarse aggregate

Coarse aggregates of nominal size 20 mm were used.

##### 5.3 Fine aggregate

Crushed sand was used. It was noted that the fine aggregate were angular.

##### 5.4 Millenium 21

Millenium 21 Integral High Performance Admixture is a versatile admixture for use with cement. It is a preparation formulated to render good workability and helps cure cement with minimal need of wetting it with water. This unique property makes it invaluable in construction.

- **Type:** *Internal curing compound*
- **Form:** *Liquid*
- **Color:** *Translucent to Transparent*
- **Shelf life:** *Six months in properly stored conditions.*

#### VI. RESULTS

##### 6.1 Compressive Strength Test

The concrete cubes were tested under compression testing machine (CTM) at 7, 14, 21 and 28 days. The average strength of conventionally cured concrete as control sample and internally cured concrete sample found are stated below:

Sr. No.	Days	Control sample	Dosage of Millenium-21/50kg cement		
			100ml	150ml	200ml
1	7	21.037	22.259	21.556	20.282
2	14	24.741	25.726	25.127	27.133
3	21	26.419	29.35	27.152	28.215
4	28	28.503	29.612	30.259	29.916

**Table -6.1:** Compressive strength of concrete in MPa

## 6.2 Graphical Representation

Graphical representation of all the above results with respect to different dosage of Millenium-21 and conventional concrete (control sample) is as follows:

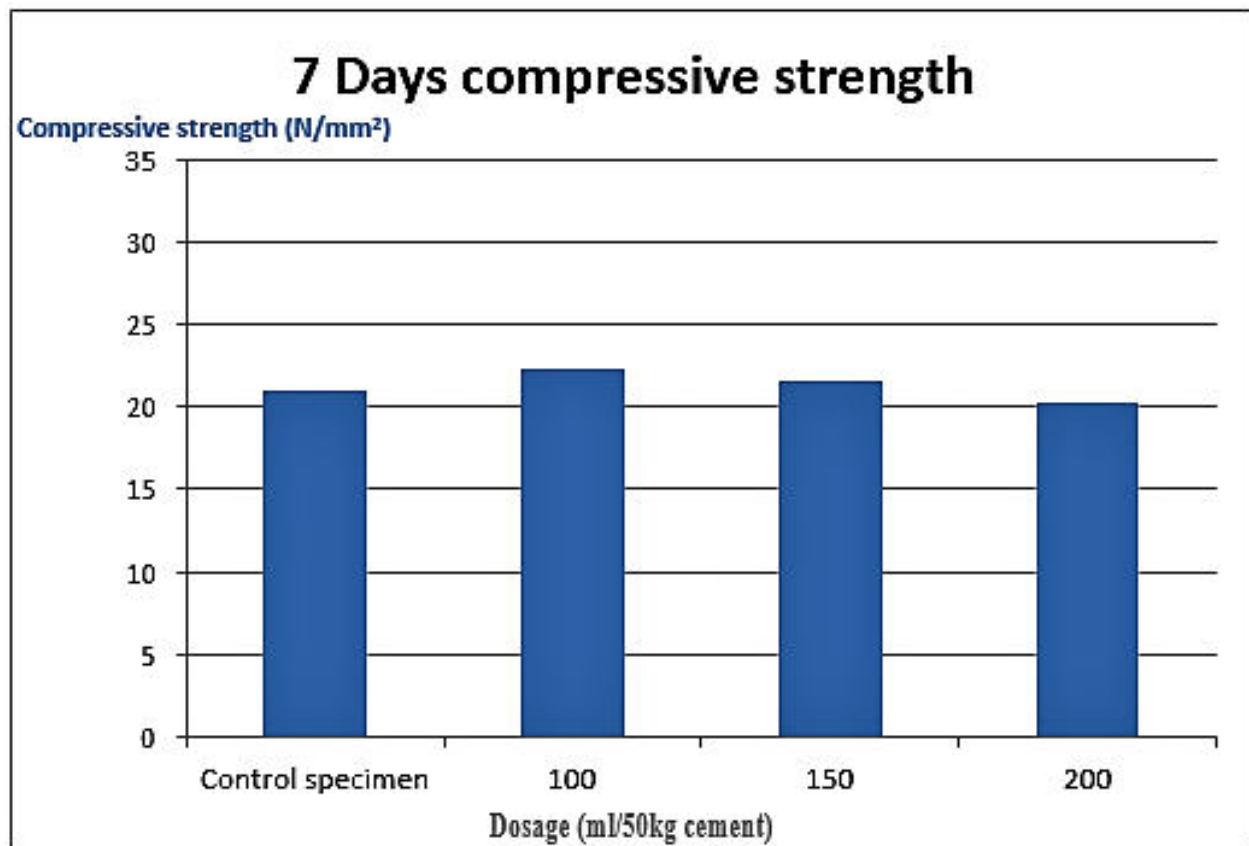


Chart -6.2.1: Graphical presentation of 7 days compressive strength

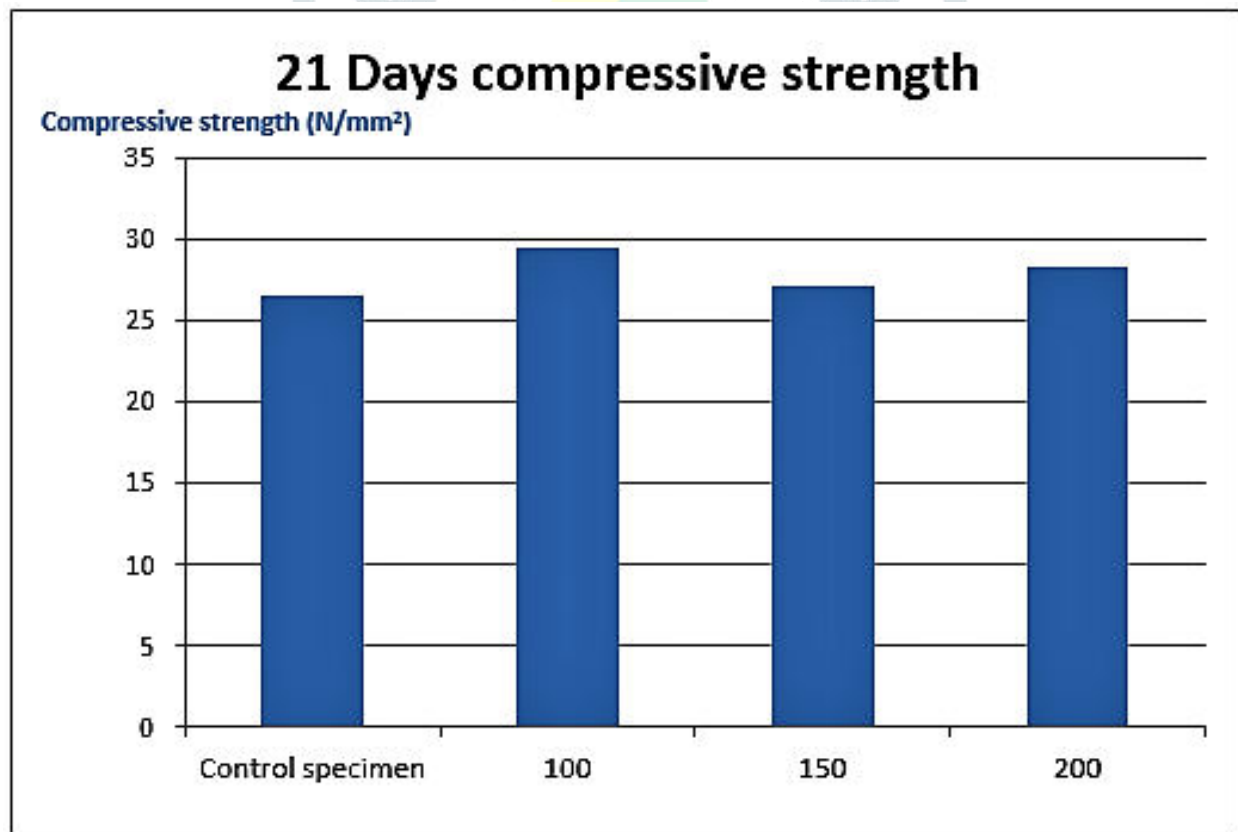


Chart -6.2.3: Graphical presentation of 21 days compressive strength

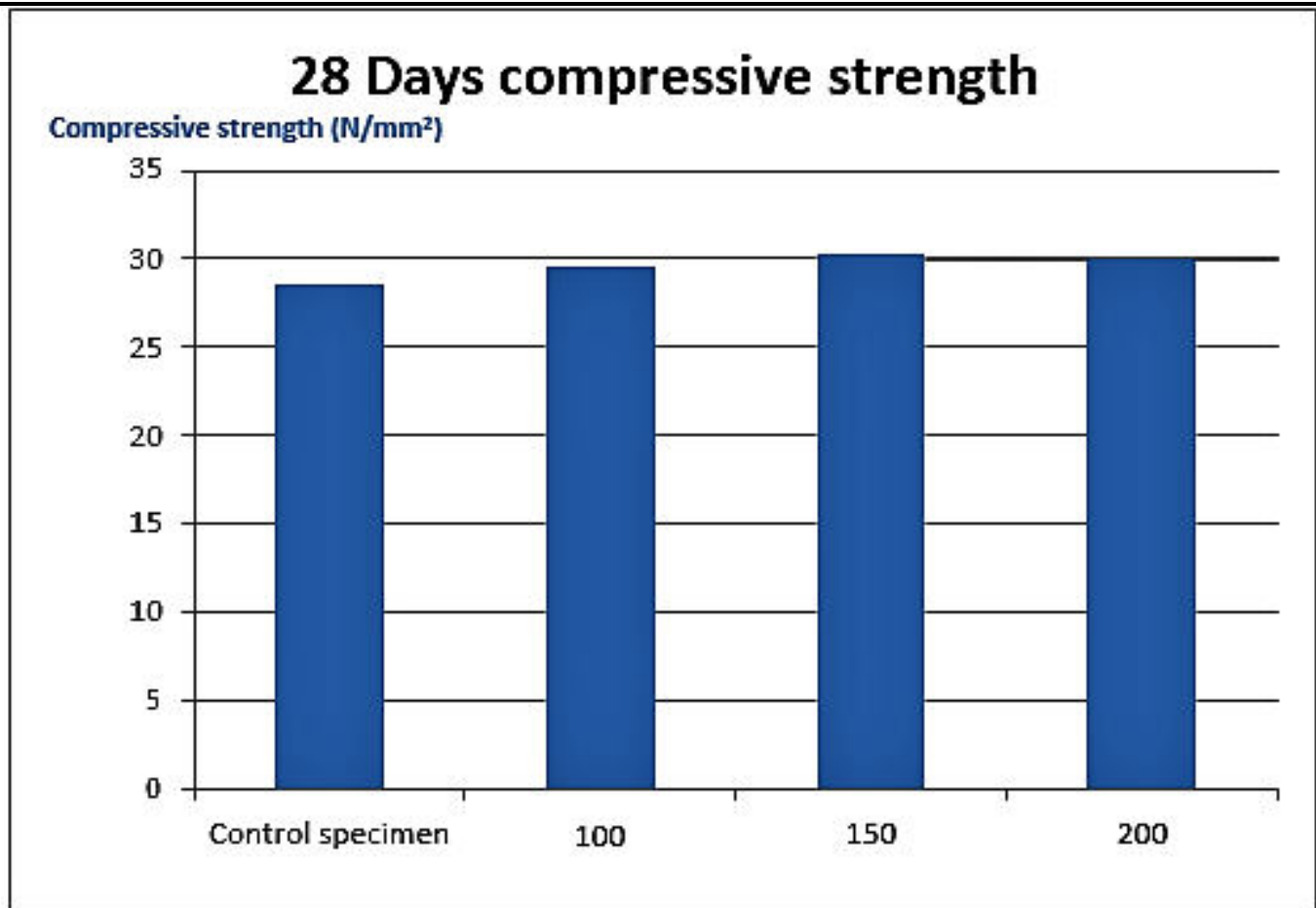


Chart -6.2.4: Graphical presentation of 28 days compressive strength

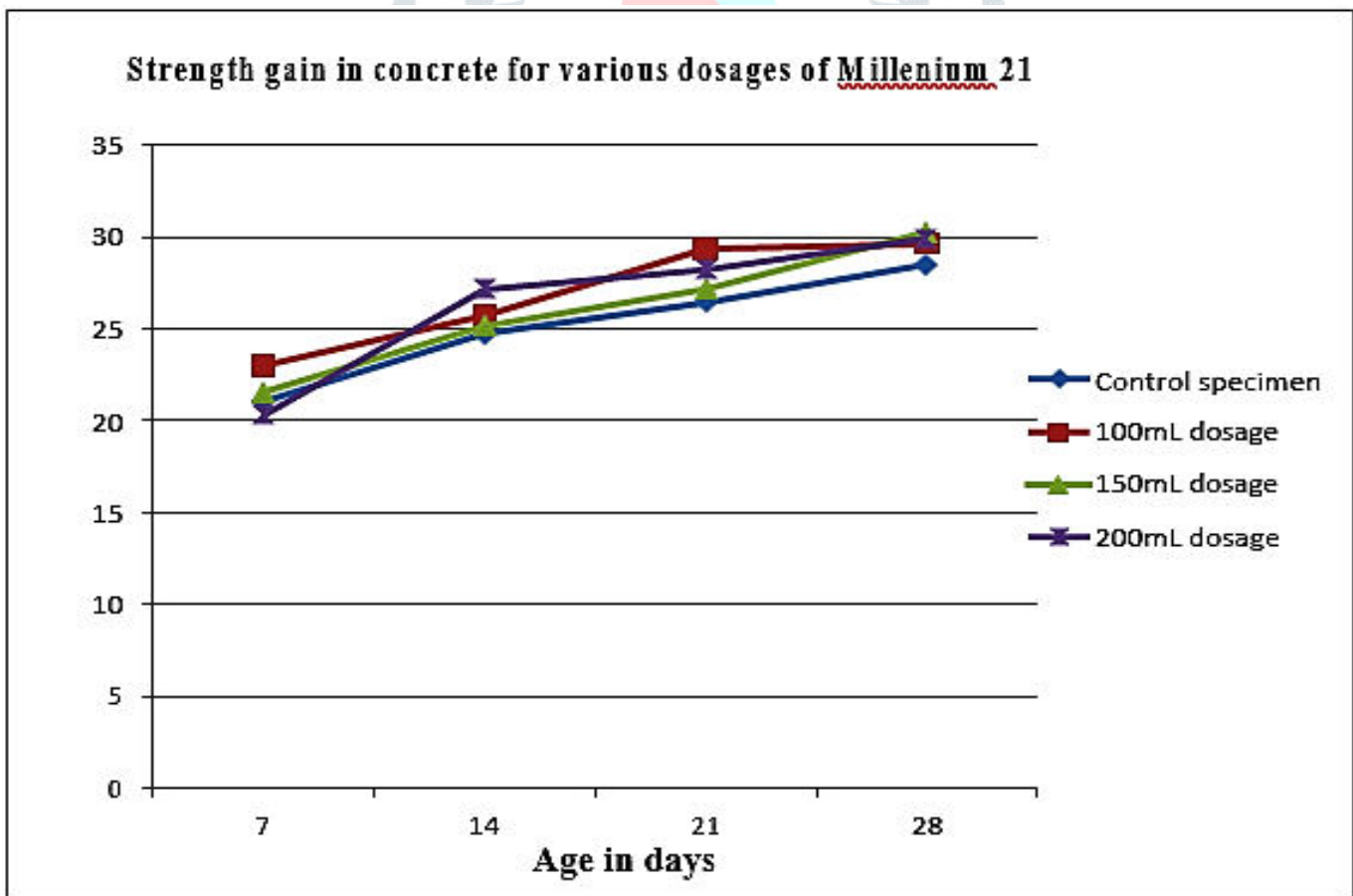


Chart -6.2.5: Graphical presentation of strength gain in concrete

## VII. CONCLUSION

- The internally cured specimens were proved to be better than conventionally cured specimens in terms of strength.
- Conventionally cured specimens showed better strength initially but the long term strength of internally cured specimens with dosage 150ml/bag was higher.

- The addition of internal curing compound increases the degree of hydration.
- Thus Millenium-21 was found to be effective internal curing compound in concrete, with optimum dosage of Millenium-21 as 150mL/50kg cement.
- The use of internal curing compound Millenium 21 can be helpful in achieving sustainability of water in areas having scarcity of water.

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