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Influence of polypropylene fibers with admixtures in strengthening of concrete

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ABSTRACT

This current project work involves an experimental and laboratory study of the Poly propylenefibers with two types of admixtures those are Quarry dust and Fly ash on the mechanical properties of the concrete used construction. In this experimental study involves two types of concrete mixes were prepared individually. Polypropylene fiber of 1% to 3% with Quarry dust of 0.1% to 0.3% and Polypropylene fiber of 1% to 4% with Fly ash of 0.1% to 0.4% by weight of cement were added to the mixes. After that, a comparative analysis has been carried out for conventional concrete to that of the fiber reinforced in relation to their compressive, split tensile and flexural properties. By the experimental work the compressive, split tensile and flexural strengths are proportionally increased both Polypropylene + Quarry dust and Polypropylene +Fly ash usage. It is observed that the optimum dosages of Polypropylene + Quarry dust is 3% + 0.3% Polypropylene +Fly ash is 4%+ 0.4% by weight of cement. In this project cost analysis is also determined for conventional concrete and fiber reinforced with admixtures individually using experimental test reports.

Keywords— *Polypropylene fibers, Structures, Concrete, Quarry dust, Fly ash*

1. INTRODUCTION

Fiber Reinforced Concrete is a cementing concrete reinforced mixture with more or less randomly distributed small fibers. In the FRC, a number of small fibers are dispersed and distributed randomly in the concrete at the time of mixing and thus improve concrete properties in all directions. The fibers help to transfer the load to the internal micro cracks. FRC is a cement based material that has been developed in recent years. It has been successfully used in construction with its excellent flexural – tensile strength, resistance to spitting, impact resistance and excellent permeability and frost resistance. It is an effective way to increase toughness, shock resistance. The main objective of this thesis is to determine the concrete strength of M20 Grade by unfair replacement of cement from 0% to 2.0% with artificial fiber (polypropylene fiber) and from 0% to 2.5% natural fiber (coconut fiber). The mix design of M20 grade concrete was designed as per the method specified in IS 10262-1982.

1.1 Fiber Reinforced Concrete (FRC)

The term Fiber Reinforced Concrete (FRC) is defined by ACI Committee 544 as a concrete finished of hydraulic cement containing fine and coarse aggregates and irregular discrete fibers. Naturally concrete is brittle under tensile loading. Mechanical properties of concrete can be enhanced by reinforcement with accidentally oriented short discrete fibers, which avert and control initiation, propagation, and coalescence of cracks. Reinforcement of concrete with a solo type of fiber may improve the desired properties to a limited level. Fiber Reinforcement is frequently used to provide toughness and ductility to brittle cementious matrices. Quite a few unlike types of fibers, both artificial and natural, have been included in concrete. Use of natural fibers in actual precedes the arrival of straight reinforced concrete in past context. However, the technological aspects of FRC systems remained really emergent.Since the initiation of fiber reinforcing of concrete in the 1940's, a huge contract of testing has been conducted on the variety of tough materials to decide the definite characteristics and compensation for each product. Some diverse types of fibers have been used to reinforce the cement-based matrices. The option of fibers varies from imitation organic materials such as polypropylene or carbon, synthetic inorganic such as steel or glass, natural organic such as cellulose or sisal to natural inorganic asbestos. At present, the trade products are reinforced with steel, glass, polypropylene and polypropylene fibers. The collection of the category of fibers is guided by the properties of the fibers such as diameter, specific gravity, Young's modulus, tensile strength etc. and the extent these fibers concern the properties of the cement matrix.

1.2 Polypropylene Fiber Reinforced Concrete (PFRC)

The Polypropylene fibers are on hand in monofilament form and fit in the thermoplastic polypropylene group. The Polypropylene fibers are warmth sensitive and above ordinary service temperature, their properties may be distorted. Polypropylene fibers are fairly hydrophobic. Polypropylene fibers have been used at little inside to manage plastic shrinkage cracking in concrete.

2. LITERATURE REVIEW

S.A Kanalli et al. (2014) [1] investigated on a comparative study of polymer fiber reinforced concrete with conventional concrete. A preliminary study on compressive strength, tensile strength and flexural using different proportions of polypropylene fibers resulted in a varying ratio of fiber dosage of 0.25 percent by volume of M20 grade concrete. Experimental studies show that maximum values of compressive split tensile and flexural strength of concrete are obtained at 0.75% fiber dosage.

Selina ruby G et al. (2014) [2] In this investigation the author study about the influence of hybrid fiber on the reinforced concrete of M40 grade concrete at a volume fraction of 0.5%. Control and three hybrid fiber composites were cast using different fiber proportions of steel and polypropylene. Compressive strength, split tensile strength and flexural strength test was performed and results were analyzed to associate with above fiber combinations. Based on 10 experimental studies, the author identifies fiber combinations that demonstrate maximum compressive, split tensile and flexural strength of concrete.

Kshitija Nadgouda et al. (2014) [3] in this studied comprises of the comparative statement of properties of coconut fiber reinforced concrete with a conventional concrete based on experiments performed in the laboratory. In this, the use of coconut fibers will also lead to better management of these waste fibers. The addition of coconut fibers better the flexural strength of concrete by about 12%, they also formed good bonding in the concrete. The study found the optimum fiber content to be 3% (by weight of cement).

3. METHODOLOGY AND MATERIAL CHARACTERIZATION

In this chapter, the tasks are existing in the chronological order in which they were performed with the help of flowchart. The outline of the methodology adopted is described in the flow chart given below . The Experimental study is carried out for the resolve of mechanical properties of concrete. Concrete mix is produced by mixing Cement, Fine aggregate, Coarse aggregate, Water, fiber (Polypropylene), admixtures(Quarry dust and Fly ash) and Superplasticizer in a definite proportion. The details of materials and their properties are discussed below.

3.1 Tests on materials

Laboratory tests were conducted to know the properties of cement, fine aggregate, coarse aggregate, Quarry dust and fly ash are discussed below:

3.1.1 Tests on Cement: Cement used in this project is of 53 Grade Ordinary Portland Cement.

3.1.1.1. Specific Gravity

- The specific gravity of cement used is 3.23.
- The specific gravity of cement as per IS requirements is in between 3-3.5.

3.1.1.2. Fineness of Cement

- The fineness of cement is tested by sieving of cement.
- The fineness of cement is 92.5%.
- The residue of cement should not exceed 10% by mass as per IS 4031: 1968.

3.1.1.3. Normal Consistency:

- The standard consistency of a cement paste is distinct as that consistency which will consent a Vicat's plunger to go through a depth of 5-7 mm from the bottom of the mould.
- The percentage of water necessary to produce a cement paste of standard consistency is 29%.
- As per IS recommendations the standard consistency of cement should be in the range of 26% -33%.

3.1.1.4. Initial Setting Time

- The time elapsed between the moment water is added to cement to the time that paste starts losing its plasticity is called initial setting time.
- The initial setting time of the cement used is 47 minutes. > 30 minutes(As per IS4031-part5-1988 code)

3.1.1.5. Final Setting Time

- The time elapsed between the moment of adding water to the cement, and the time when the paste has completely lost its plasticity is called final setting time.
- The final setting time of cement is 4hours 40 minutes. < 10 hours (As per IS 4031- part5-1988 code).

4. PREPARATION OF SAMPLES AND EXPERIMENTAL SETUP

In this chapter explain about the preparation of Mix design to cast the samples and experimental methodology for carrying out Compressive, Split tensile and Flexural strength of concrete samples. 3 different types of concrete mixes were prepared (ORC, PPRC with QD and PPRC with FA) and 280 samples are casted for different fiber dosages.

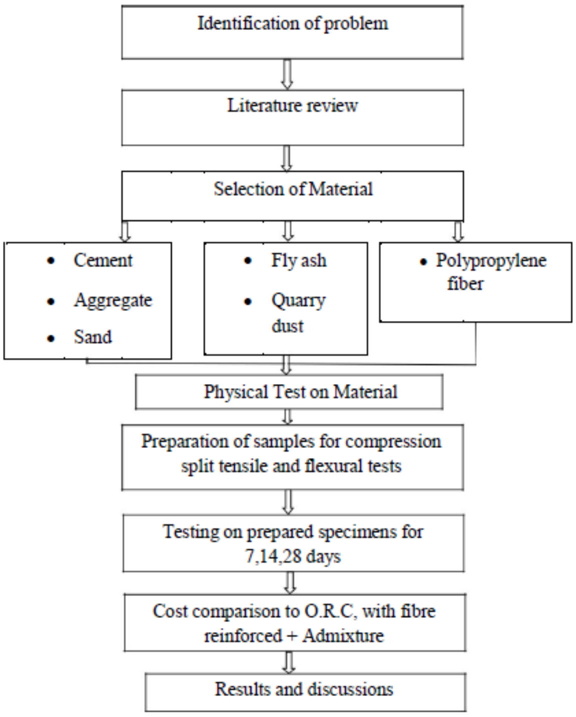

Fig. 1: Flow chart for the methodology

4.1 Grade Designation: M20

(a) Characteristic Comp. Strength required in the field at 28 days = 20 Mpa
(b) Maximum size of aggregate = 20 mm
(c) Type of exposure = Mild
(d) Minimum cement content = 300 kg/m3
(e) (IS-456:2000)
(f) Maximum water cement ratio = 0.55

4.2 Test data for materials

(a) Cement Used = OPC 53Grade
(b) Specific Gravity of
- Fine Aggregate = 2.40
- Coarse Aggregate – 20mm = 2.80

(c) Specific Gravity of Cement = 3.14
(d) Sand corresponds of Zone = Zone III

4.3 Target Strength For Mix Proportioning

For a tolerance factor of 1.65 and using table 1, the obtained target mean strength for the given grade of concrete

$$F1_{ck} = F_{ck} + 1.65\times S$$

Where
$F1_{ck}$ = target average compressive strength at 28 days
F_{ck} = characteristic compressive strength at 28 days and
S = standard deviation
As per IS Code standard deviation, (S=4 N/mm2 for M20 grade concrete)
Therefore, target strength = 20 + 1.65 x 4 =26.6N/mm2

4.4 Selection of water – cement ratio

From table 5 of IS 456:2000, Maximum water cement ratio = 0.55
Based on trails adopt water cement ratio as = 0.5

4.5 Calculation of cement content

From table No.5 IS-456:2000 min. cement content for Mild exposure condition = 300 kg
Calculation of water content = 300×0.5=150 lit
From table 3 of IS 10262:2009, volume of coarse aggregate corresponding to 20mm size aggregate and fine aggregate (Zone-III)
For water cement ratio of 0.5 = 0.64
Corrected proportion of volume of course aggregate for water cement ratio of 0.5 = 0.64

4.6 Mix calculation:

a) Volume of concrete = $1m^3$

b) Volume of cement 1/1000 = (Mass of cement/ Specific gravity of cement) × = 300/3.15 × 1/1000 = 0.0952 m^3
c) Volume of water = (Mass of water/ Specific gravity of water) × 1/1000 = 150/1 × 1/1000 = 0.15 m^3
d) Volume of chemical admixture (super plasticizer) = (mass of admixture/specific gravity of admixture) × (1/1000) =0.0061m3
e) Volume of all in aggregate (e) = [a-(b+c+d)] =0.7487m3
f) Mass of coarse aggregate = e × volume of coarse aggregate × specific gravity of coarse aggregates × 1000 = 1245.8 kg/m3
g) Mass of fine aggregate = e ×volume of coarse aggregates × specific gravity of coarse aggregates × 1000 = 737.91 kg/m3

4.7 Mix-proportions

Cement = 300kg/m3
Water = 150 liters
Fine aggregate = 737.91 kg/m3
Coarse aggregate = 1245.8 kg/m3
Chemical admixture = 2.17 kg/m3
Water-cement ratio = 0.5

5. PRESENTATION OF RESULTS AND DISCUSSIONS

5.1 Workability of Concrete

Slump cone test was performed to determine the slump of the ordinarily reinforced concrete mixes. The slump values for various mixes.

Table 1: Slump values for different % of Polypropylene Fiber + Quarry dust

% of Polypropylene Fiber + Quarry dust	Slump(mm)
0	108
1% + 0.1%	97
2% + 0.2%	94
3% + 0.3%	81
4% + 0.4%	72

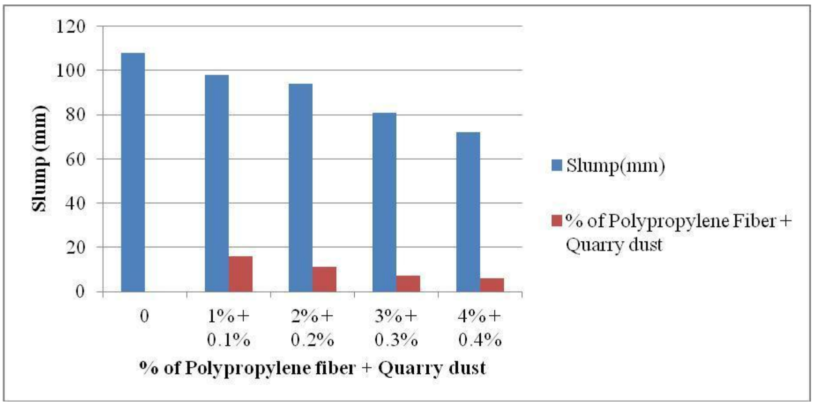

Fig. 2: Variation of a slump with different % of Polypropylene Fiber + Quarry Dust

Table 2: Slump values for different % of Polypropylene Fiber + Fly ash

% of Polypropylene Fiber + Fly ash	Slump(mm)
0	108
1% + 0.1%	101
2% + 0.2%	94
3% + 0.3%	91
4% + 0.4%	86
5% +0.5%	79

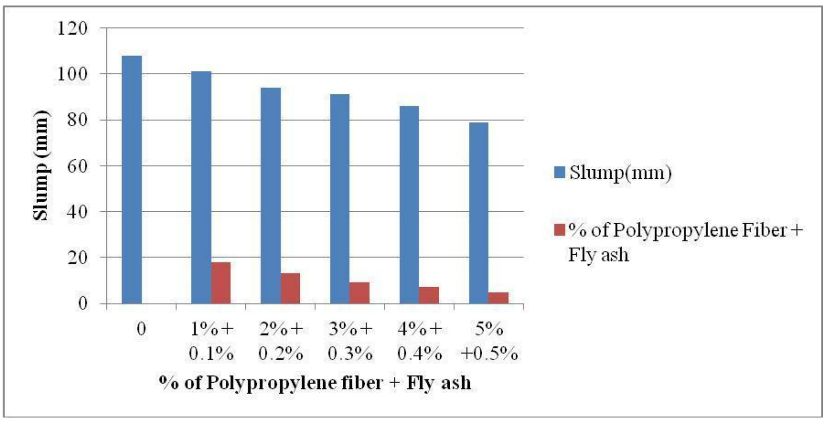

Fig. 3: Variation of a slump with different % of Polypropylene Fiber + Fly ash

Description of Result:

From figure 2 and figure 3, it is perceived that as the percentage of fiber increases the slump of the concrete is decreasing. This may be due to the fiber, as the percentage of fiber increases they obstructing the flow of the concrete.

5.2 Mechanical characteristics of PPRC and Quarry Dust

5.2.1 Compressive strength of PPRC and Quarry dust cube specimens

Table 3: Compressive strengths of PPRC and Quarry Dust cube specimens

Mix	7 days (MPa)	14 days (MPa)	28 days (MPa)
O.R.C	18.55	22.62	26.72
PPRC+Q.D (1%+0.1%)	21.51	28.02	34.02
PPRC+Q.D (2%+0.2%)	26.33	33.87	39.56
PPRC+Q.D (3%+0.3%)	29.99	36.54	44.26
PPRC+Q.D (4%+0.4%)	28.02	35.09	42.78

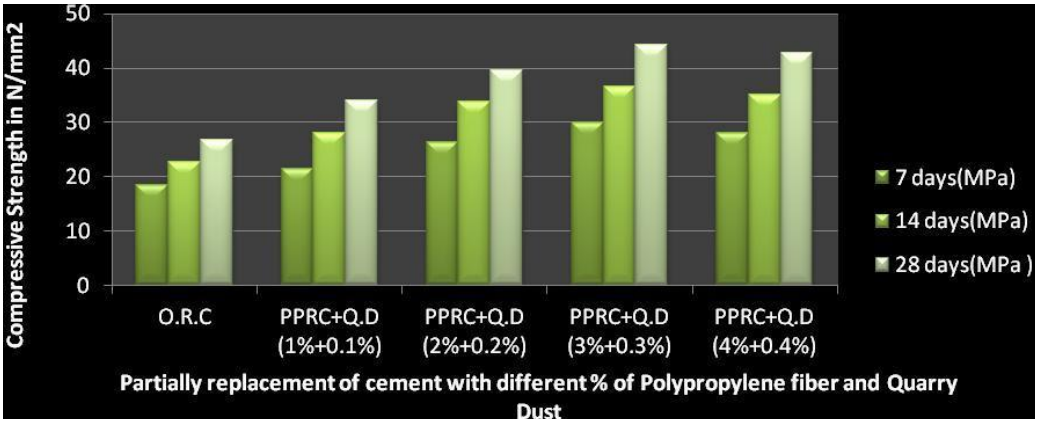

Fig. 4: Compressive strength values of O.R.C and PPRC+ Q.D at 7, 14 and 28 Days

Description of Result:

(a) From figure 4, it is perceived that the compressive strength of the concrete increases to 13.76%, 29.54% and 58.67% when % of fiber increases from 1%, 2% and 3% of PPRC and0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 7 days.

(b) It is perceived that the compressive strength of the concrete increases to 19.27%, 33.21% and 38.09% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 14 days.

(c) It is perceived that the compressive strength of the concrete increases to 21.45%, 32.45% and 39.62% from1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 28 days.

(d) It is perceived that compressive strength values decreased as the percentage of fibers and admixture increases beyond 3% and 0.3% respectively.

5.2.2 Split tensile strength of PPRC and Quarry dust cylinder specimens

Table 4: Split tensile strengths of PPRC and Quarry Dust cylinder specimens

Mix	7 days(MPa)	14 days(MPa)	28 days(MPa)
O.R.C	0.99	1.6	2.54
PPRC+Q.D (1%+0.1%)	1.02	1.91	2.89
PPRC+Q.D (2%+0.2%)	1.55	2.02	3.32
PPRC+Q.D (3%+0.3%)	1.92	2.54	3.89
PPRC+Q.D (4%+0.4%)	1.67	2.00	3.57

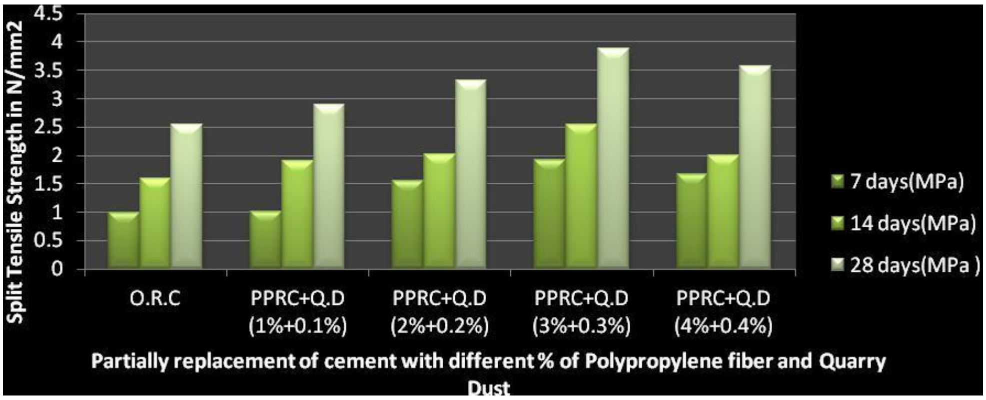

Fig. 5: Split tensile strength values of O.R.C and PPRC+ Q.D at 7, 14 and 28 Days

Description of result:

(a) From figure 5, it is perceived that split tensile strength of the concrete increases to 2.94%,36.12% and48.43% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%,0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 7 day.

(b) It is perceived that split tensile strength of the concrete increases to 16.23%, 20.79% and 37% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 14 days.

(c) It is perceived that split tensile strength of the concrete increases to 12.11%, 23.49% and 34.70% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 28 days.

(d) It is perceived that split tensile strength values decreased as the percentage of fibers and admixture increases beyond 3% and 0.3% respectively.

5.2.3 Flexural strength of PPRC and quarry dust prism specimens

Table 5: Flexural strength values of PPRC and Quarry Dust prism specimens

Mix	7 days(MPa)	14 days(MPa)	28 days(MPa)
O.R.C	1.72	2.86	4.57
PPRC+Q.D (1%+0.1%)	1.94	2.99	5.01
PPRC+Q.D (2%+0.2%)	2.45	3.03	6.57
PPRC+Q.D (3%+0.3%)	2.99	4.47	7.82
PPRC+Q.D (4%+0.4%)	2.81	3.82	6.71

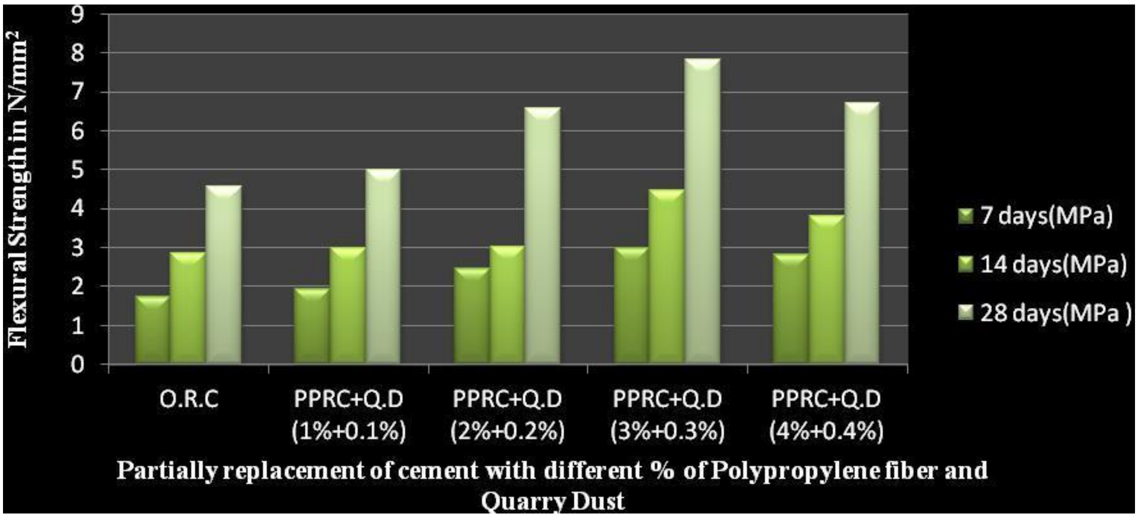

Fig. 6: Flexural strength values of O.R.C and PPRC+ Q.D at 7, 14and 28 Days

Description of Result:

(a) From figure 6, perceived that flexural strength of the concrete increases to 11.34%, 29.79%, and 42.47% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 7 days.

(b) It is perceived that flexural strength of the concrete increases to 4.54%, 5.94% and 36.01% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 14 days.

(c) It is perceived that the flexural strength of the concrete increases to 8.78%, 30.44% and 41.56% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 28 days.

(d) It is perceived that flexural strength values decreased as the percentage of fibers and admixture increases beyond 3% and 0.3% respectively.

5.3 Mechanical characteristics of PPRC and Fly ash

5.3.1 Compressive strength of PPRC and Fly ash cube specimens

Table 6: Compressive strengths values of PPRC and Fly ash Cube specimens

Mix	7 days(MPa)	14 days(MPa)	28 days(MPa)
O.R.C	18.55	22.62	26.72
PPRC+F.A (1%+0.1%)	20.84	24.09	33.03
PPRC+F.A (2%+0.2%)	22.66	29.54	36.22
PPRC+F.A (3%+0.3%)	24.02	31.88	40.54
PPRC+F.A (4%+0.4%)	27.44	34.07	41.98
PPRC+F.A (5%+0.5%)	25.89	31.97	39.23

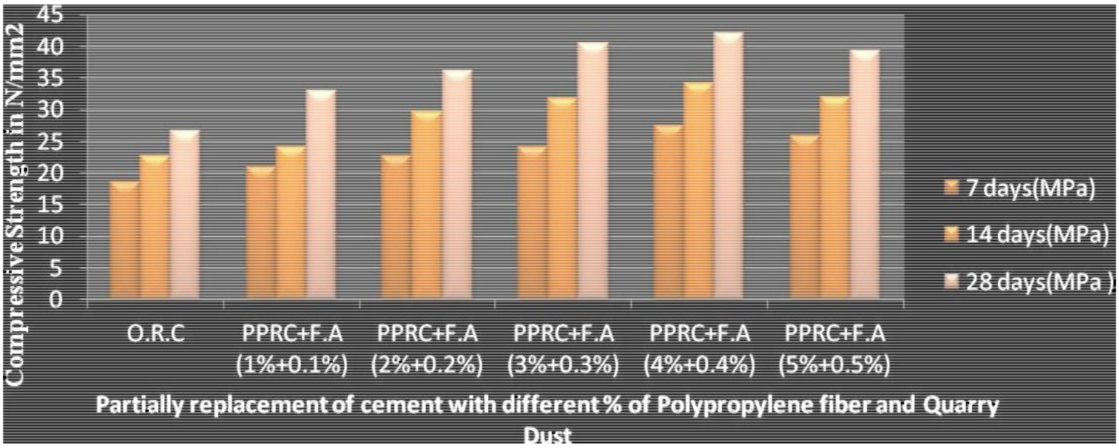

Fig. 7: Compressive strength values of PPRC and Fly ash Cube specimens at 7, 14 and 28 days

Description of Result:

(a) From figure 7, perceived that compressive strength of the concrete increases to 10.98%, 18.13%,22.77%,32.39% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 7 days.

(b) It is perceived that compressive strength of the concrete increases to 6.10%, 23.42%, 40.93%, 50.61% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 14 days.

(c) It is perceived that compressive strength of the concrete increases to 19.10%, 26.22%, 34.08%, 36.35% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 28 days.

(d) It is perceived that compressive strength values decreased as the percentage of fibers and admixture increases beyond 4% and 0.4% respectively.

5.3.2 Split tensile strength of PPRC and Fly ash cylinder specimens

Table 7: Tensile strengths values of PPRC and Fly ash at 7, 14 and 28days

Mix	7 days(MPa)	14 days(MPa)	28 days(MPa)
O.R.C	0.99	1.6	2.54
PPRC+F.A (1%+0.1%)	1.01	1.75	2.88
PPRC+F.A (2%+0.2%)	1.49	1.88	3.01
PPRC+F.A (3%+0.3%)	1.62	2.02	3.58
PPRC+F.A (4%+0.4%)	1.86	2.41	3.65
PPRC+F.A (5%+0.5%)	1.71	2.38	3.50

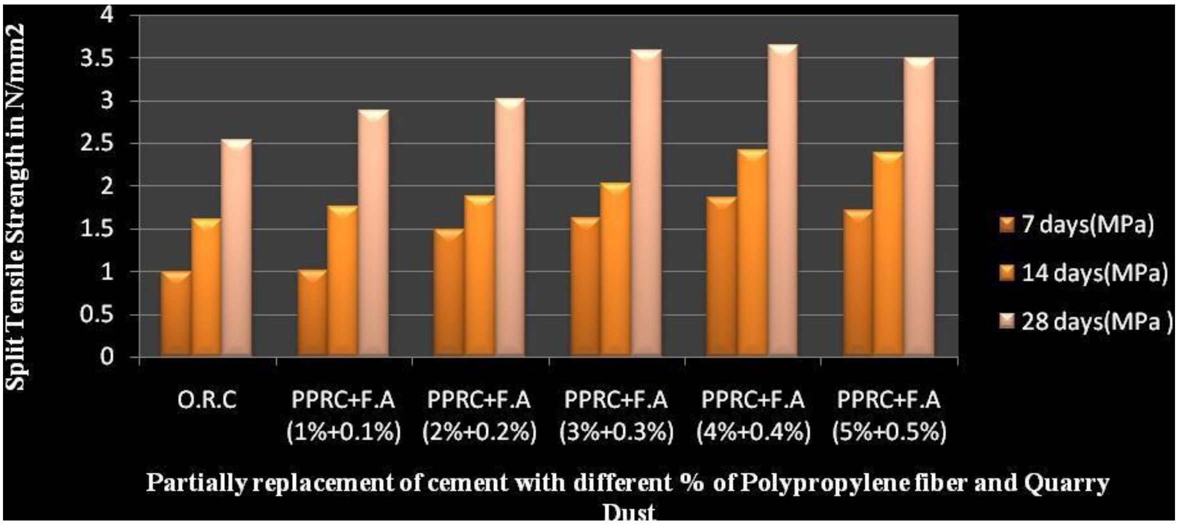

Fig. 8: Split tensile strength values of PPRC and Fly ash cylinder specimens at 7, 14 and 28 Days

Description of result:

(a) From figure 8, perceived that split tensile strength of the concrete increases to 1.98%, 33.55%, 38.88%,46.77% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 7 days.

(b) It is perceived that split tensile strength of the concrete increases to 8.57%, 14.89%, 20.79%, 33.60% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 14 days.

(c) It is perceived that split tensile strength of the concrete increases to 11.80%, 15.61%, 29.05%, 30.41% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 28 days.

(d) It is perceived that split tensile strength values decreased as the percentage of fibers and admixture increases beyond 4% and 0.4% respectively.

5.3.3 Flexural strength of PPRC and Fly ash prism specimens

Table 8: Flexural strength values of PPRC and Fly ash prism specimens

Mix	7 days(MPa)	14 days(MPa)	28 days(MPa)
O.R.C	1.72	2.86	4.57
PPRC+F.A (1%+0.1%)	1.86	2.92	5.26
PPRC+F.A (2%+0.2%)	2.09	3.58	5.88
PPRC+F.A (3%+0.3%)	2.48	3.91	6.97
PPRC+F.A (4%+0.4%)	2.62	4.39	7.54
PPRC+F.A (5%+0.5%)	2.54	4.08	7.19

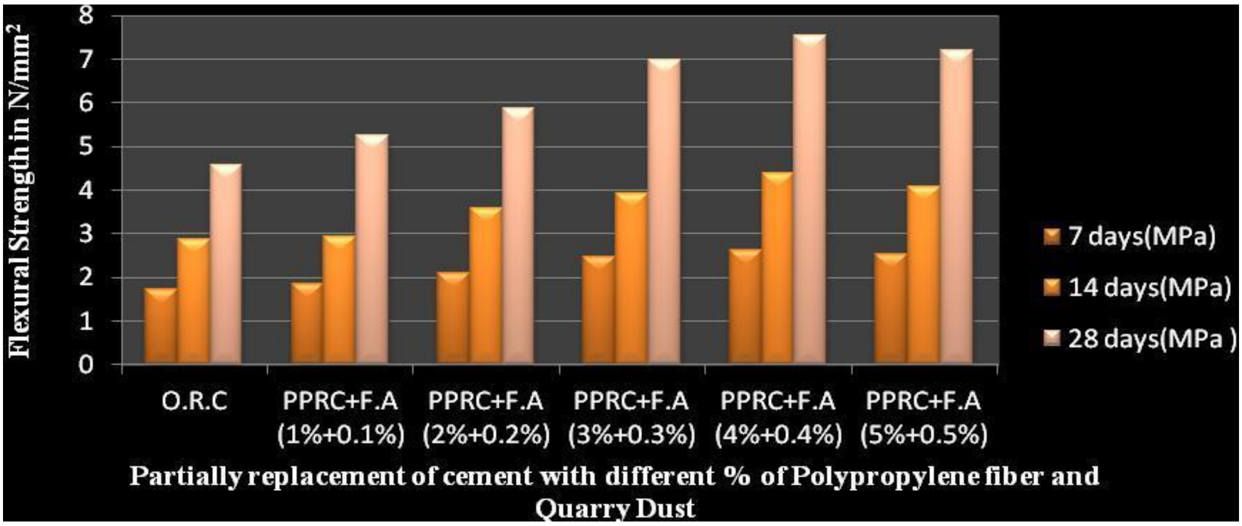

Fig. 9: Flexural strength values of PPRC and Fly ash at 7, 14 and 28 Days Description of Result:

Description of result:

(a) From figure 9, perceived that flexural strength of the concrete increases to 7.52%, 17.70%, 30.64%, 34.35% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 7 days.

(b) It is perceived that flexural strength of the concrete increases to 2.05%, 20.11%, 26.85%, 34.85% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3%, 0.4% and 5% of FA when it is compared with ordinary reinforced concrete at 14 days.

(c) It is perceived that flexural strength of the concrete increases to 13.11%, 22.27%, 34.43%, 39.38% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 28 days.

(d) It is perceived that flexural strength values decreased as the percentage of fibers and admixture increases beyond 4% and 0.4% respectively.

5.4 Relative comparison of PPRC with Quarry dust and Fly ash

(a) From the results perceived that 3% and 0.3% addition of Polypropylene fiber with Quarry dust increases the compressive strength by 8.25.% when it is compared with 4% and 0.4% of Polypropylene fiber with Fly ash at 28 days.

(b) From the results perceived that 3% and 0.3% addition of Polypropylene fiber with Quarry dust increases the split tensile strength by 12.36% with 4% and 0.4% of Polypropylene fiber with Fly ash at 28 days.

(c) From the results perceived that 3% and 0.3% addition of Polypropylene fiber with Quarry dust increases the flexural strength by 5.24% with 4% and 0.4% of Polypropylene fiber with Fly ash at 28 days.

(d) It is perceived that flexural strength values decreased as the percentage of fibers and admixture increases beyond 4% and 0.4% respectively.

6. CONCLUSIONS

(a) It is perceived that the concrete slump values are decreasing with the increasing fiber percentage. The reduction in a slump with the increase in the fiber will be attributed to the presence of fibers which causes obstruction to the free flow of concrete.

(b) It is perceived that the optimum dosage of polypropylene fiber + Quarry dust is 3%+0.3% & polypropylene fiber + Fly ash is 4%+0.4%.

(c) It is perceived that the compressive strength of the concrete increases to 21.45%, 32.45% and 39.62% from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 28 days.

(d) It is perceived that split tensile strength of the concrete increases to 12.11%, 23.49% and 34.70% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 28 days.
(e) It is perceived that flexural strength of the concrete increases to 8.78%, 30.44% and 41.56% when % of fiber increases from 1%, 2% and 3% of PPRC and 0.1%, 0.2% and 0.3% of QD when it is compared with ordinary reinforced concrete at 28 days.
(f) It is perceived that compressive strength of the concrete increases to 19.10%, 26.22%, 34.08%, 36.35% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 28 days.
(g) It is perceived that split tensile strength of the concrete increases to 11.80%, 15.61%, 29.05%, 30.41% when % of fiber increases from 1%, 2%, 3% and 4% of PPRC and 0.1%, 0.2%, 0.3% and 0.4% of FA when it is compared with ordinary reinforced concrete at 28 days.

7. REFERENCES

[1] Abhijeet.R.Agrawal, Sanket.S.Dhase, Kautuk.S.Agrawal "Coconut Fiber In Concrete To Enhance Its Strength And Making Lightweight Concrete" in IJERD, 2014.
[2] S.A Kanalli, Ramu palankar, Bharat kumar, Praveen kumar, Prakash S.K "Comparitive Study Of Polymer Fiber Reinforced Concrete With Conventional Concrete Pavement" in IJRET, 2014.
[3] Selina Ruby G., Geethanjali C., Jaison Varghese, P. Muthu Priya" Influence OfHybrid Fiber On Reinforced Concrete" in IJASGE, 2014.
[4] Kshitija Nadgouda "Coconut Fiber Reinforced Concrete" in Proceedings of Thirteenth IRF International Conference, 14th September 2014, Chennai, India, ISBN: 978-93-84209-51-3.
[5] Ahsana Fathima k m "Behavioural study of steel fiber and polypropylene fiber Reinforced concrete" International Journal of Research in Engineering & Technology\(IMPACT: IJRET) ISSN(E): 2321-8843; ISSN(P): 2347-4599 Vol. 2, Issue 10, Oct 2014, 17-24.
[6] K.Murahari "Effects of Polypropylene fibers on the strength properties of fly ash based concrete" International Journal of Engineering Science Invention ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 Volume 2 Issue 5 ǁ May. 2013 ǁ PP.13-19.
[7] Dr.T.Ch.Madhavi "Polypropylene Fiber Reinforced Concrete- A Review" International Journal of Emerging Technology and Advanced Engineering Volume 4, Special Issue 4, June 2014.
[8] Kolli.Ramujee "Strength properties of polypropylene Fiber reinforced concrete" International Journal of Innovative Research in Science, Engineering and Technology Volume 2, Issue 8, August 2013.
[9] G. Navya, J. Venkateswara Rao "Experimental Investigation on Properties Concrete Paver Block with The Inclusion Of Artificial Fibers" in IJERA 2014.
[10] Rakesh kumar, Pankaj goel and Renu mathur "Suitability Of Concrete Reinforced With Synthetic Fibers For The Construction Of Pavement" Third International Conference on Sustainable Construction Materials and Technologies.

