Study of Steel Fibre Reinforced Concrete and Glass Fibre Reinforced Concrete

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***Abstract*— Concrete is a relatively brittle material, when subjected to normal stresses and impact loads. as result for their characteristics plain concrete members could not support loads and tensile stresses that occurred, concrete beams and slabs. Over the decades, there has been a significant increase in the use of fibers in concrete for improving its properties such as compressive strength and workability. The fiber concrete is also used in retrofitting existing concrete structures. Among many different types of fibers available today, glass fiber and steel fiber is a recent introduction in the field of concrete technology. . Glass fiber has the advantages of having higher tensile strength and fire resistant properties, thus reducing the loss of damage during fire accident of concrete structures. The important properties of steel fiber is its superior resistance to cracking and crack propagation. The addition of steel reinforcement and glass reinforcement significantly increases the strength of concrete, and results of steel fiber reinforced concrete the development of microcracks in concrete structure must be checked and glass fiber reinforced concrete has high tensile strength and fire resistant .the M20 grade of concrete are arrived with following ingredient such as cement ,fine aggregate, coarse aggregate, water, steel fiber, glass fiber and superplasticizer. The variables in this study include the steel fiber(crimpled) and glass fiber (alkali resistant) percentage in addition. The compressive strength of steel fiber and glass fiber reinforced concrete with the varying percentage of fiber of M20 grade of concrete.**

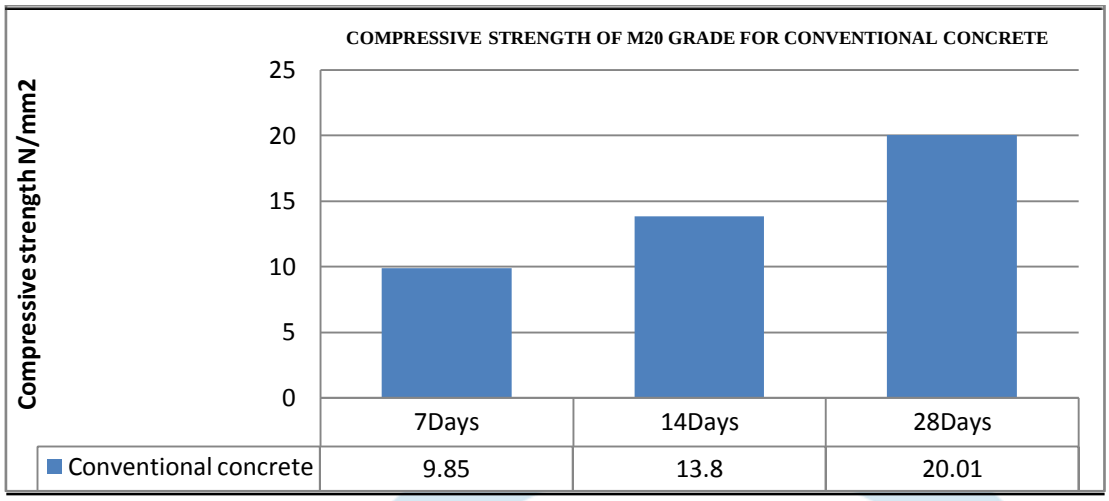
***IndexTerms*— Steel fiber, Glass fiber, Compressive strength**

Introduction

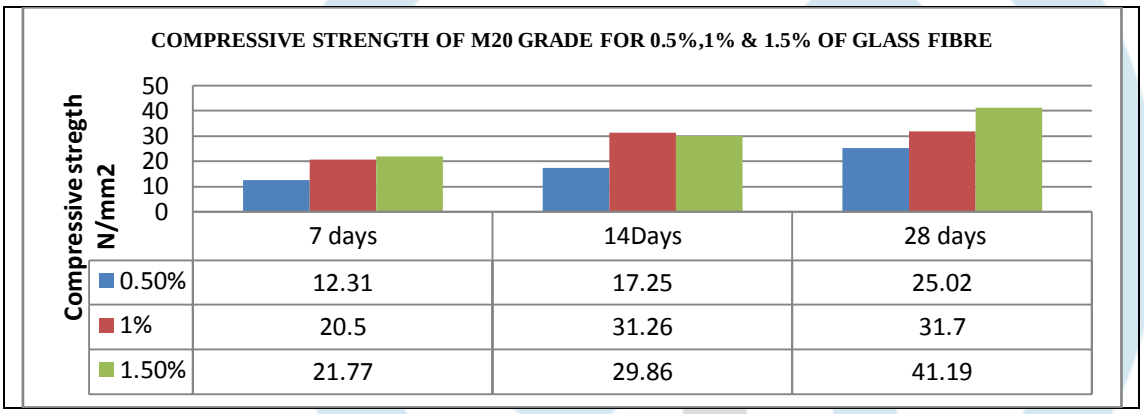
Concrete is the most widely used construction material which has several desirable properties like high compressive strength, stiffness and durability under normal usual environmental factors. While at the same time concrete found to be brittle and weak in tension. It is well known that concrete mixed with other material was applied for resistance purpose. Fiber reinforce concrete is a family of composite materials that combine the high compressive strength properties of cement mortars with significantly increased impact, flexural and tensile strengths imparted by the fiber reinforcement. Without any fiber in the concrete there was development of the cracks due to plastic shrinkage, drying shrinkage and other reasons of changes in volume of concrete. The development of these micro cracks causes elastic deformation of concrete. The presence of fibers provides crack arresters. When the first crack occurs in the matrix, the strong fibers pick up the load. That support is stronger than the matrix itself, so the next crack must occur elsewhere. More loading adds only new cracks, immediately arrested, rather than causing first cracks to propagate. Failure develops as a gradual, like - plastic yielding. In the present work, glass fibers, 10 micro-meter in diameter and 12 mm long and steel fiber, of 0.75mm diameter with 60mm length in diameter are used for the preparation of standard grade concrete. A preliminary test program has been carried out to study the strength characteristics of fiber reinforced concrete with the addition of glass fiber and steel fiber to concrete.

Result & discussion

The compressive strength of concrete is one of the most important design parameters required for concrete. The results plotted on the graphs below are the average values of three cubes tested at each age and Glass fiber, Steel fiber and superplasticizer percentage.



It is observed that compressive strength of 7th ,14th and 28th day of M20 grade of concrete. Maximum strength of conventional concrete at 28 days of curing period.



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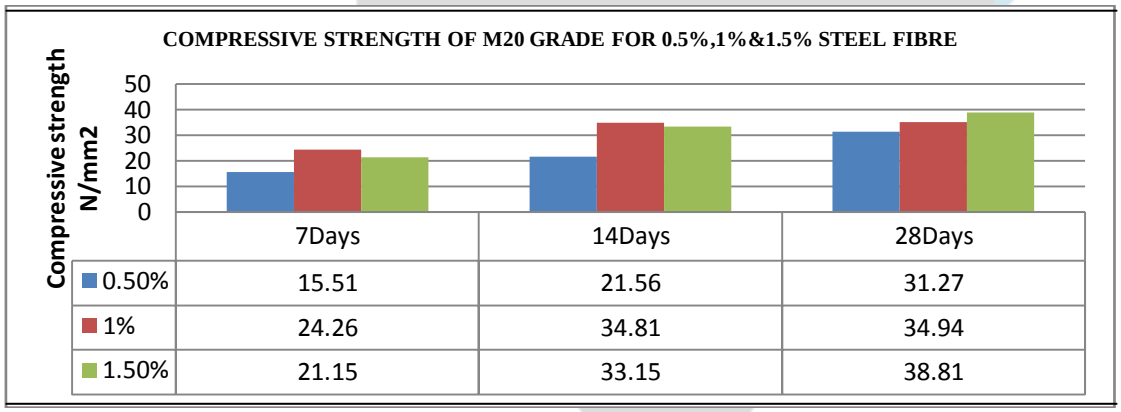
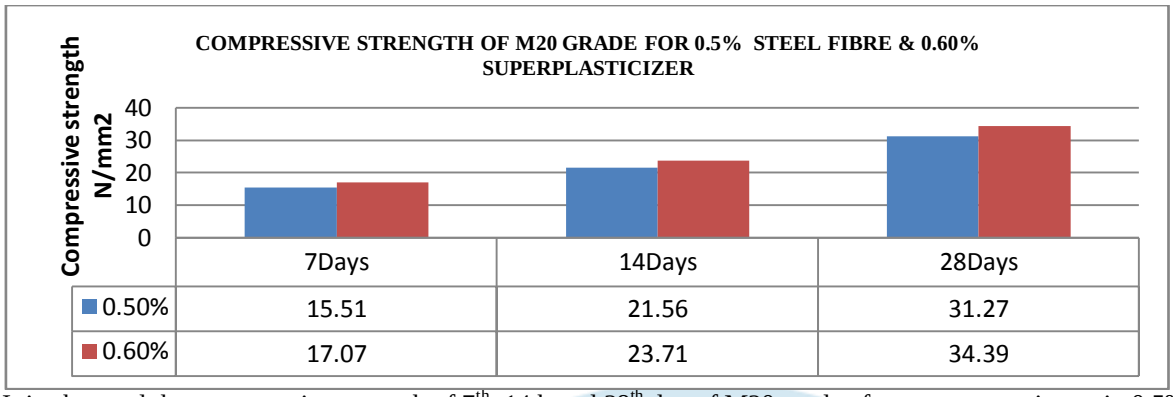


It is observed that compressive strength of 7th ,14th and 28th day of M20 grade of concrete. maximum in 1.5% 0f Steel fiber at 28 days , minimum in 0.5%. An 1.5 % of Steel fiber slightly decreases than 1% of Steel fiber at 7th and 14th days of curing period .



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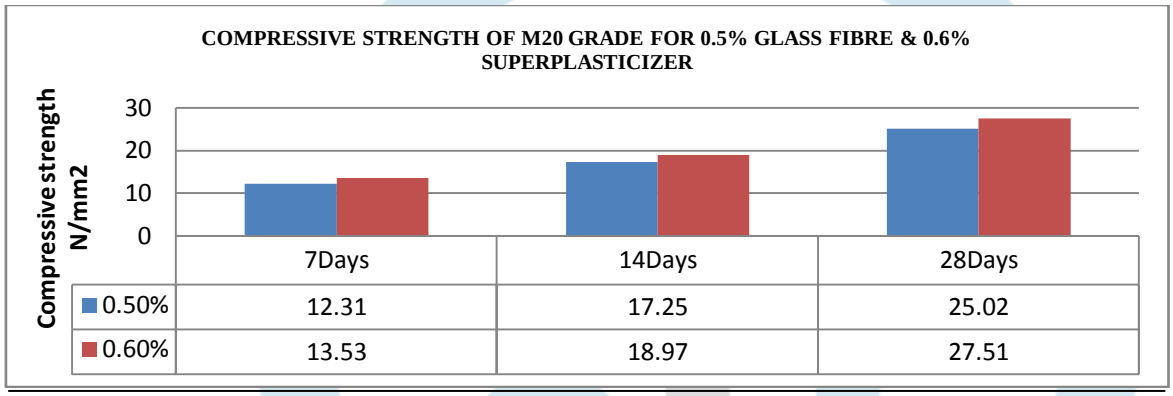

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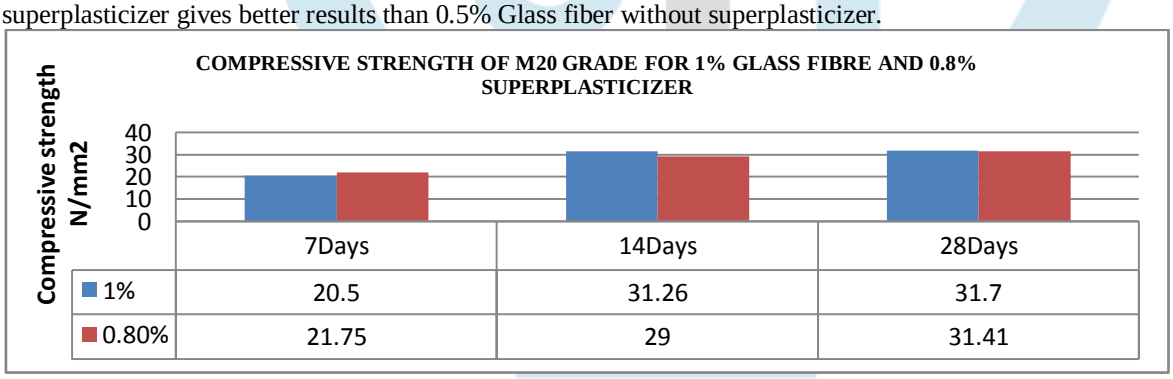
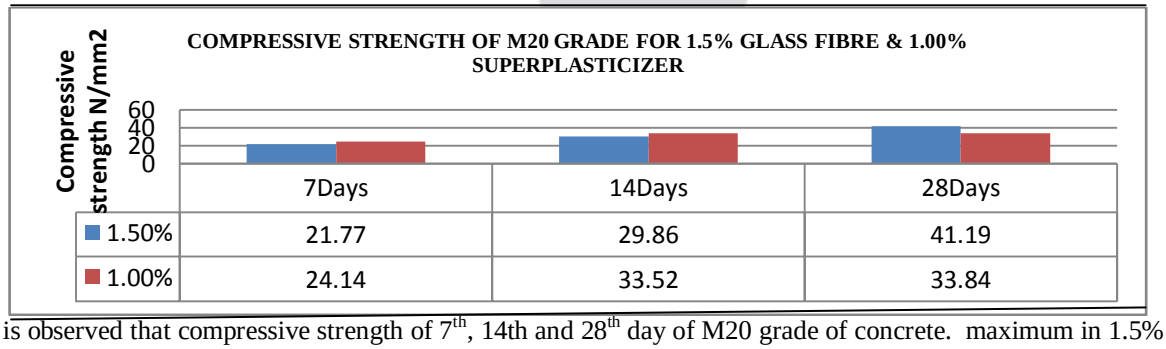


It is observed that compressive strength of 7th, 14th and 28th day of M20 grade of concrete. maximum in 1% of Glass fiber with 0.8% 0f Superplasticizer at 7 days, minimum in 1% of Glass fiber without superplasticizer. An 1% of Glass fiber with 0.8% superplasticizer at 14 ,28 days slightly decreases .



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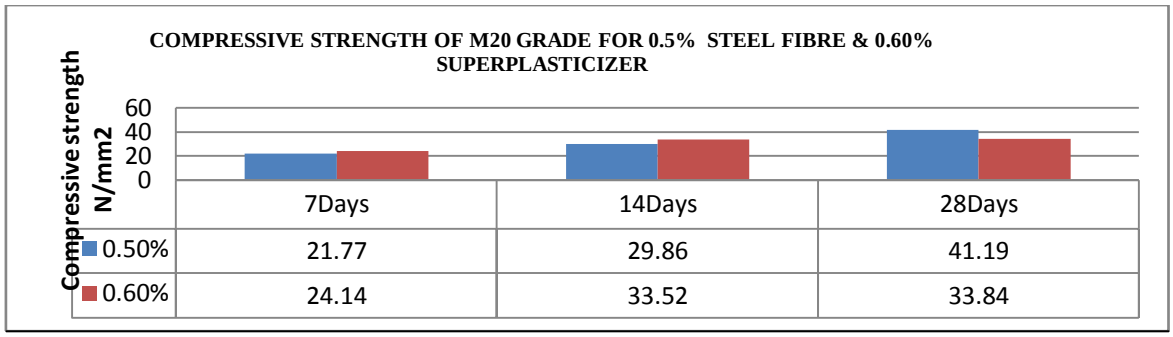

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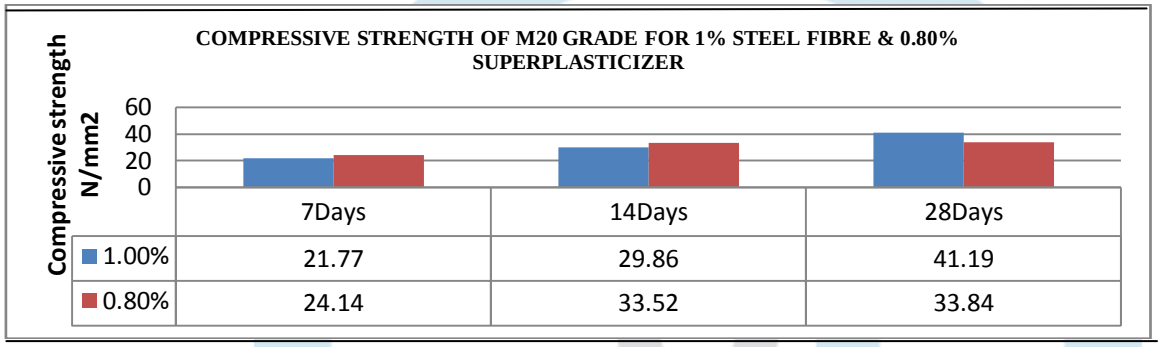

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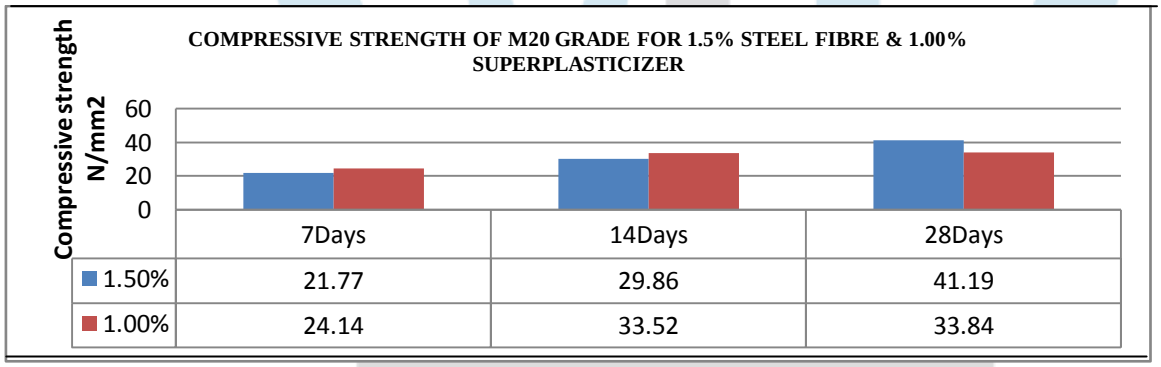

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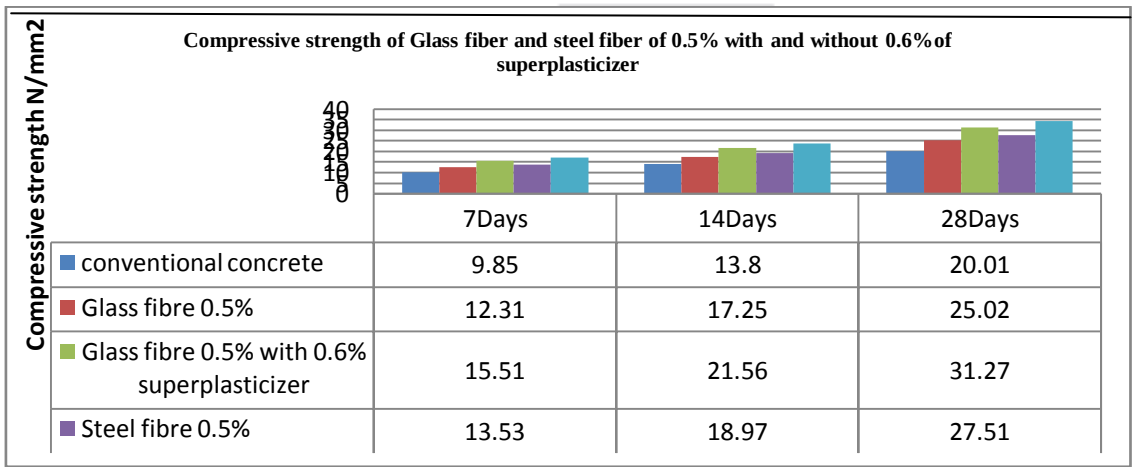
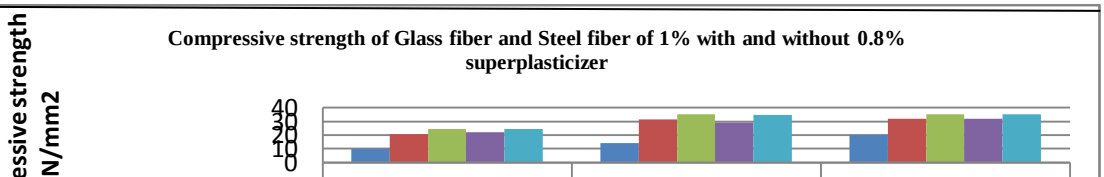


It is observed that compressive strength of 7th ,14th and 28th day of M20 grade of concrete. maximum in 1% 0f steel fiber with 0.8% superplasticizer as compared to 1% of Glass fiber with 0.8% superplasticizer. Maximum in 1% Steel fiber as compared to 1% Glass fiber .by using Glass and Steel Fiber compressive strength increases as compared to conventional concrete.



	7Days	14Days	28Days
conventional concrete	9.85	13.8	20.01
Glass fibre 1%	20.5	31.36	31.7
Glass fibre 1% with 0.8% superplasticizer	24.26	34.81	34.94

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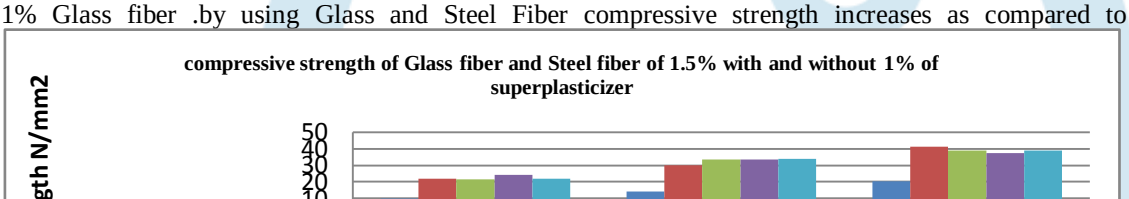

	7Days	14Days	28Days
conventional concrete	9.85	13.8	20.01
Glass fibre 1.5%	21.77	29.86	41.19
Glass fibre 1.5% with 1% superplasticizer	21.15	33.15	38.81
Steel fibre 1.5%	24.14	33.52	37.17

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Conclusion

The following conclusion can be drawn from the work completed to date

1.The using of steel fiber and glass fiber with superplasticizer in concrete generally increases the ultimate strength of concrete.

2. The optimum dosage of Superplasticizer with steel fiber for maximum strength was found to be 1.5% for M20 as compare to Glass fiber reinforced concrete with superplasticizer.

3. As percentage of Steel Fiber increases slump increases for M20 of concrete.

4.It is observed that compressive strength are on higher side for 1.5% steel fibers as compared to that produced from 0.5%, 1% fibers. It is observed that compressive strength increases from 8 to 21% for 7 days, 6 to 12% for 28 days

5. From the result of workability test result, it was found that the superplasticizer improved workability and it is water reducer.

6. Glass fiber utilization especially in concrete is significant as it increases the life of concrete roads and structures by improving concrete durability.

7.Increasing the percentage of superplasticizer in concrete, increases the chances of flowability in concrete.

Future scope

The present research work leaves a wide scope for future investigators to explore many other aspects of this experimental work. some recommendations for future research include:

1.The other properties of fiber reinforced concrete such as split tensile strength, flexural strength, compaction factor may be determined using extensive experimentation.

2. The experiment can be extended by increasing grades of concrete such as M25,M30

References

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