COMPARATIVE STUDY OF GLASS FIBRE REINFORCED CONCRETE & STEEL FIBRE REINFORCED CONCRETE

[1]A.P.Modak [2] G.P.Deshmukh
[1]M.E Student [2] Assistant Professor
[1]Civil Engineering Department
[1]Pankaj Laddhad Institute and Technology, Buldana,India

Abstract— Concrete is a relatively brittle material,when subjected to normal stresses and impact loads.as result for there characteristics plain concrete members could not support loads and tensile stresses that occurred,concrete beams and slabs.the addition of steel reinforcement and glass reinforcement significantly increases the strength of concrete,and results of steel fibre reinforced concrete the development af microcracks in concrete structure must be checked and glass fibre 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 fibre,glass fibre and superplasticizer.the variables in this study include the steel fibre(crimpled) and glass fibre (alkali resistant) percentage in addition.The compressive strength of steel fibre and glass fibre reinforced concrete with the varying percentage of fibre of M20 grade of concrete.

Index Terms—Glass fibre ,Steel fibre,Compressive strength.

I. 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.In the present work, glass fibers, 10 micrometre in diameter and 6 mm long and steel fibre, 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 fibre reinforced concrete with the addition of glass fiber and steel fibre to concrete.

II. MATERIALS

Cement Pozzolana Portland cement is used in the project work, as it is readily available in the local market. The cement used in the project work has been tested for various preparations as per IS: 4031-1988 and found to be conforming to various specifications of IS: 1489-1991.

Fine aggregate Locally available river sand conforming to grading zone 2 of IS: 383-1970. Clean and dry river sand available locally will be used. Sand passing through IS 4.75mm sieve will be used for casting all the specimens.

Coarse aggregate Crushed annular granite metal from a local source will be used as a course aggregate. The coarse aggregate used in the project work of 60% of 20mm aggregate and 40% of 10mm aggregate.

Glass fibre It is the material made from extremely fine fibres of glass. It is a light weight, extremely strong and robust material. There are distinctive sorts of fibre however in these we have taken AE-glass fibre to show better resistance and a very good insulation to electricity.

Water Water should be free from acids, oils, alkalies, vegetables or other organic impurities. Soft waters also produce weaker concrete. Water has two functions in a concrete mx. Firstly, it reacts chemically with the cement to form the cement paste in which the inert aggregates are held in suspension until the cement paste has hardened. Secondly, it serves as a lubricant in the mixture of fine aggregates and cement.

Steel Fiber Percentage volume fraction of fibres was varied from 0 to 2 % Crimpled steel fibre of 0.75mm diameter with 60mm length is used and its aspect ratio is 80. Density of steel fiber is 7850Kg/m^3.

Super plasticizer: High range water reducing admixture of Cerahyperplast XR W40 having a specific gravity of 1.01- 1.11 was used to maintain the workability of mix.

III. METHODOLOGY

The collection of material for the Glass fibre reinforced concrete and Steel fibre reinforced concrete are obtained for M20 concrete mixes were collected and casted.The convebtional concrete was cured in water M20 Grade mixes were designated in accordance with IS:10262-2009.Convetional concrete was casted with M20 mix and made to water curing.Another set of cubes were casted using Glass Fibre and Steel Fibre of 0.5%,1%and 1.5% with M20 concrete and allowed for water curing.Cubes were casted for 7,14,28 days for conventional concrete ,Glass fibre and steel fibre to study the compressive strength.For this experimental study a total 63 cubes were casted for determine the strength.The specimens are taken from the water after 7 days,14 days and 28 days and visual observation are made.

IV. RESULT AND DISCUSSION

The compressive strength of concret at 7,14 and 28 days curing of cube for M20 grade of concrete are given in the fig. The results shows that there is increase in compressive strength in case of glass fibre reinforced concrete and Steel fibre reinforced concrete specimen when compared to conventional concrete.

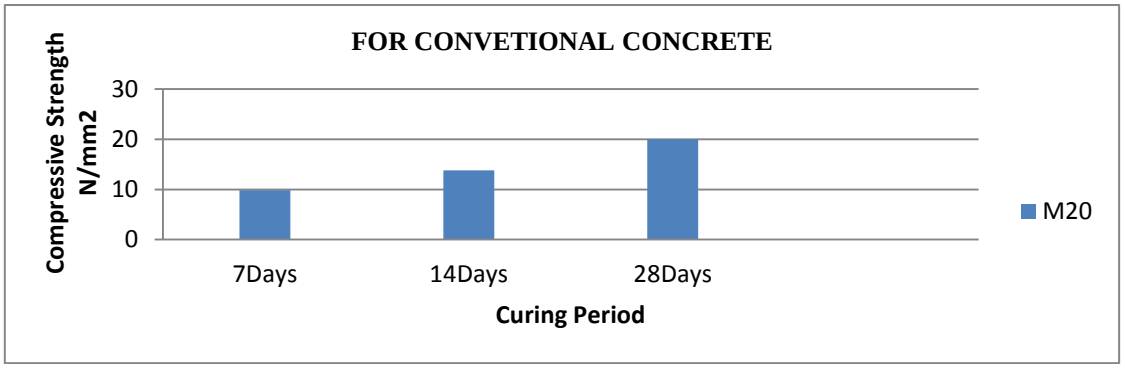

Figure no: 1 conventional concrete

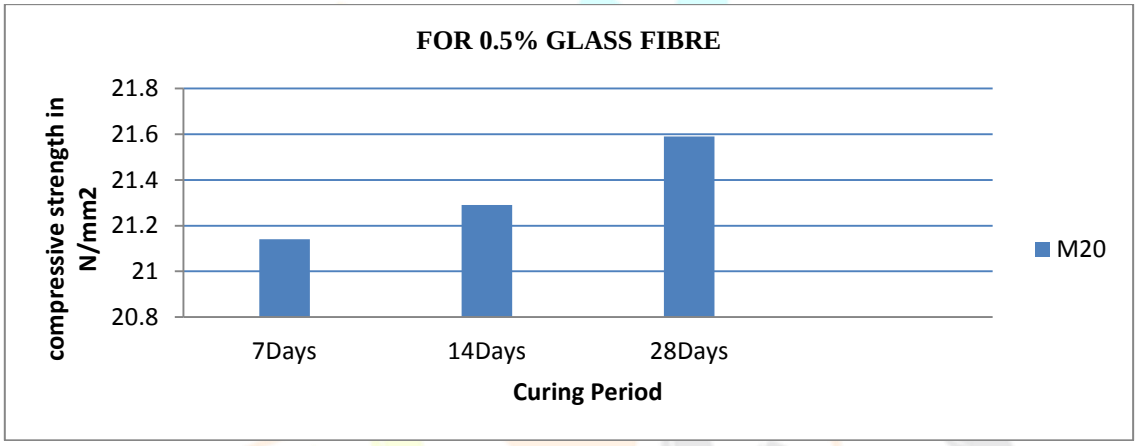

Figure no: 2 0.5% Glass Fibre

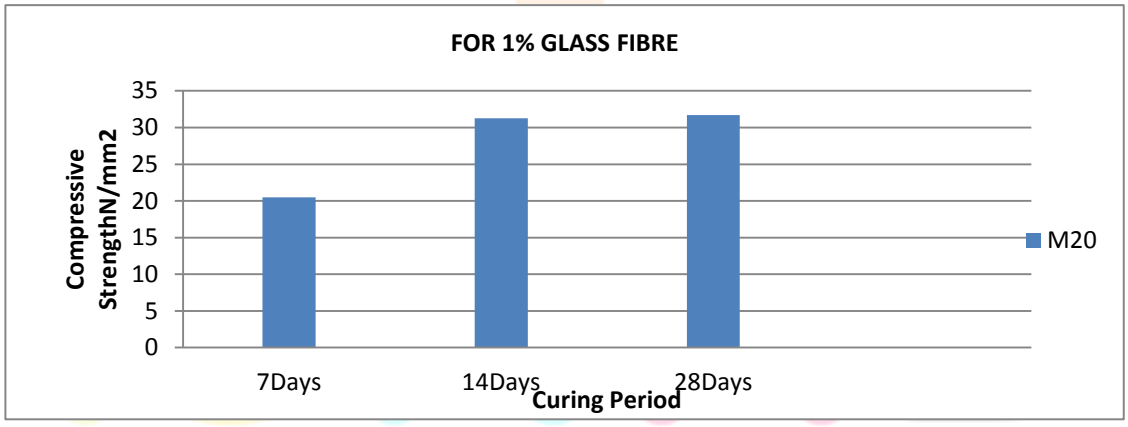

Figure no:3 1.0% Glass Fibre

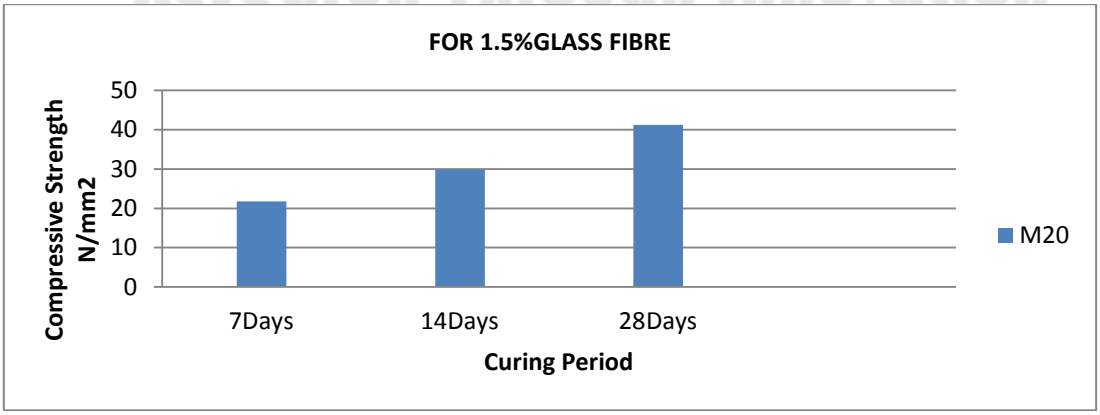

Figure no:4 1.5% Glass Fibre

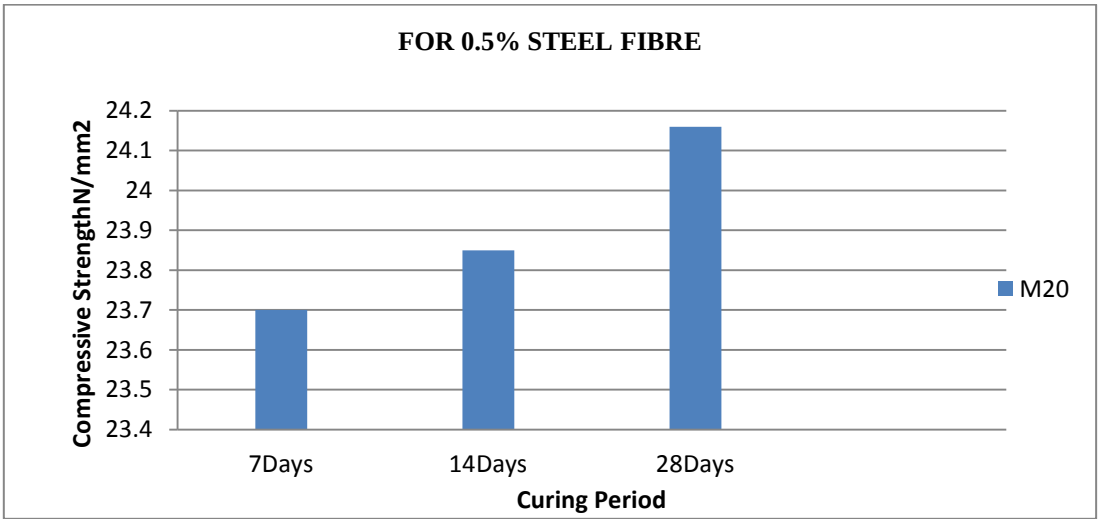

Figure no:5 0.5% Steel Fibre

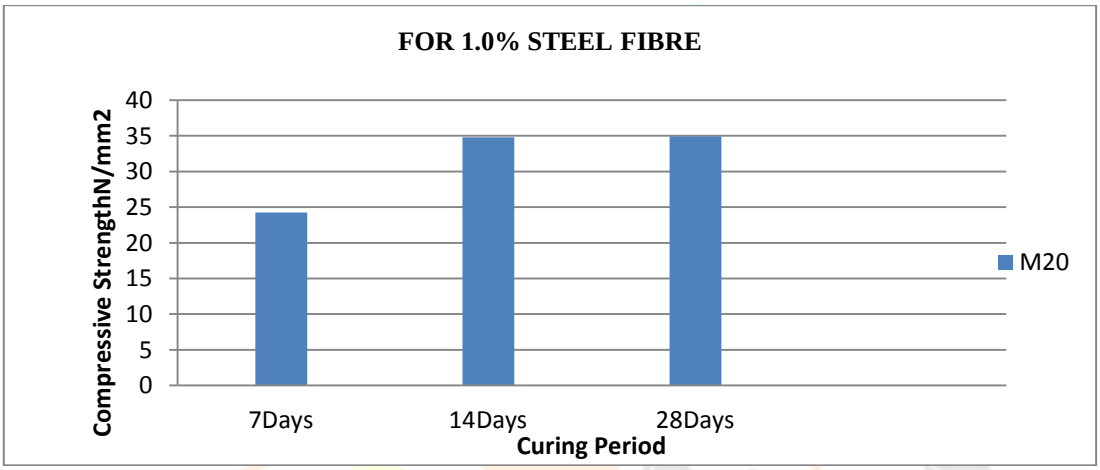

Figure no:6 1.0% Steel Fibre

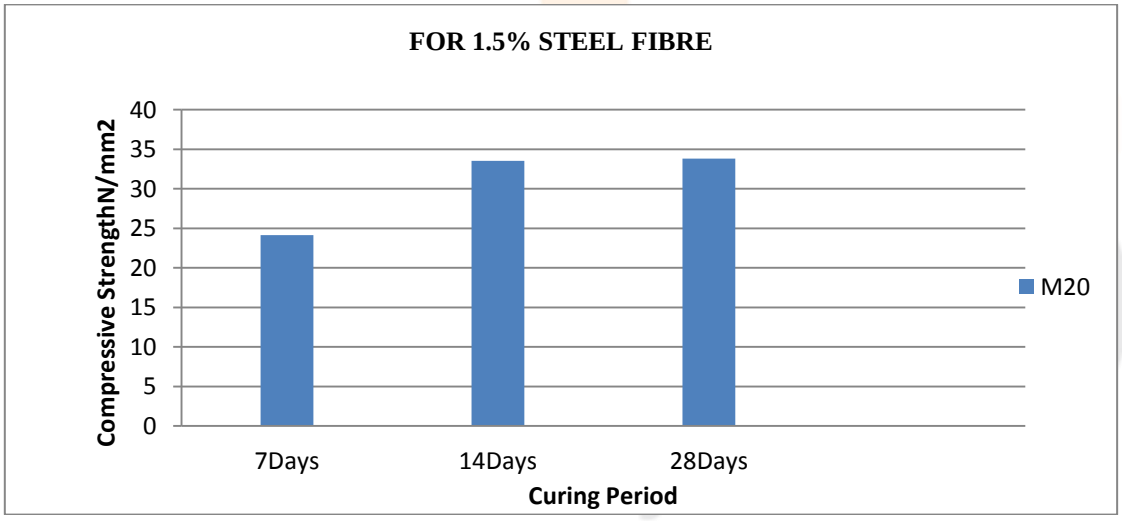

FIGURE NO:7 1.5% STEEL FIBRE

V. CONCLUSION

The following conclisions could be drawn from present investigation.

1. Max.compressive strength for M20 Grades of concrete was obtained by addition of 1.5%.
2. It is observed that compressive strength increases from 8 to 21% for 7 days ,6 to 12% for 28 days.
3. Workability of concrete increases by the use of steel fibre reinforced concrete.

VI. REFERENCES

[1] Dr. K.M.Tajne, P.S.Bhandari "Effect of Glass Fibre on Ordinary Concrete", volume 3 Issue 11,November 2014.

[2] Pushpendra Soni, Raksha Parolkar "Study And Analysis Of Durability Of Fibre Reinforced Concrete" International. Journal Of Engineering Sciences & Research Technology,Published June 2015

[3] Eric P. Koehler and David W. Fowler "Study And Analysis Of Durability Of Fibre Reinforced Concret", International Journal Of Engineering Sciences & Research Technology,Published June 2015.

[4] Eric P. Koehler and David W. Fowler "Summary of Concrete Workability Test Methods" Aggregates Foundation for Technology, Research, and Education,Published August 2003.
[5] Eng. Pshtiwan N. Shakor, Prof. S. S. Pimplikar."Glass Fibre Reinforced Concrete Use in Construction",©gopalax -International Journal of Technology And Engineering System Jan –March 2011- Vol.2.No.2.
[6] Faisal Fouad Wafa "Properties and Applications of Fiber Reinforced Concrete" JKAU Eng. Sci., Vol. 2, pp. 49-63.
[7] Anette Jansson "Fibres in reinforced concrete structures- analysis, experiments and design the study".
[8] Kavita S Kene, Vikrant S Vairagade and Satish Sathawane," Experimental Study on Behavior of Steel and Glass Fiber Reinforced Concrete Composites" Bonfrin International Journal of Industrial Engineering and Management Science, Vol. 2, No. 4, December 2012.
[9] Komal Chawla1 and Bharti Tekwani1 (2013) "Studies Of Glass Fiber Reinforced Concrete Composites".
[10] K.Srinivasa Rao, S.Rakesh kumar, A.Laxmi Narayana " Experimental Studies on Steel Fiber Reinforced Concrete" American Journal of Engineering Research Volume-02, Issue-03, pp-20-26,Published 2013.