Analysis on Crimped Steel Fibre Concrete

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Abstract: Plain concrete has a very low tensile strength, limited flexibility, and very little resistance to cracking. It also has extremely restricted ductility. There is an inherent presence of internal micro cracks in the concrete, and the weak tensile strength of the concrete is actually caused by the development of these micro cracks, which ultimately results in the concrete breaking into brittle pieces. It has been established that the incorporation of small fibers that are consistently scattered and tightly spaced into concrete would not only serve as a crack arrester but would also significantly enhance the concrete's compressive and flexural strength qualities. Fiber reinforced concrete is the name given to this particular form of concrete. In this particular study, the steel fibers were utilized. 50 millimeters on each side is the ratio of the length to the aspect ratio of the steel fibers. As part of the ongoing inquiry, an effort has been undertaken to improve the strength of concrete by including steel fibers into the mixture. In order to investigate the variance in compressive strength, a cube with dimensions of 150 millimeters by 150 millimeters by 150 millimeters was cast. Steel fibers were cast into three different numbers of cubes, each of which had a different percentage. By weight of cement, the steel fiber was added at a percentage of 0%, 0.5%, 1%, and 1.5% respectively. For the purpose of analyzing the variance in the splintered tensile strength of concrete, a cylindrical specimen with a bottom diameter of 150 millimeters and a height of 300 millimeters was purchased. Different percentages of steel fibers were used to determine the cost of three different numbers of cylindrical specimens. There were four different percentages of steel fibers added to the cement: 0%, 0.5%, 1%, and 1.5% by weight. The compressive strength and split tensile strength of concrete can be increased by increasing the quantity of steel fibers incorporated into the concrete up to a certain limit. The experimental study illustrates the many levels of strength that can be achieved by incorporating steel fibers into concrete. Concrete of the M20 grade is used for the research, and the compressive strength and split tensile strength of concrete at the ages of seven days and twenty-eight days are estimated based on the results of the tests that were carried out. Furthermore, it has been discovered that the inclusion of one percent steel fiber by weight of cement results in the highest possible compressive strength and split tensile strength.

***Index Terms* – Steel, Fiber Concrete, Tensile Strength, Cylindrical mould**

I. INTRODUCTION

Each and every building business need cement, fine aggregate, and coarse aggregate as fundamental components. When it comes to the preparation of mortar and concrete, fine aggregate is a significant component that plays a crucial part in the mix design process. As a result of the extensive usage of concrete and mortar, the consumption of natural fine aggregate is generally significant. As a result, because developing countries are experiencing fast infrastructure construction, there is a very strong demand for fine aggregate. Countries that are still in the process of developing, such as India, are experiencing a lack of fine aggregate of a high quality. Fine aggregate resources are being depleted, which poses a significant risk to both the environment and society. Rapid extraction of fine aggregate from river beds and causing a multitude of problems, including the loss of water-retaining soil strata, the deepening of river beds and the resulting bank slides, the loss of vegetation on the riverbank, the disruption of aquatic life, and the disruption of agriculture due to a decrease in the water table in the well, are some examples of the situations that can arise. The extensive use of river fine aggregate for construction purposes in Sri Lanka has resulted in a number of detrimental issues. As a result, there are a number of alternatives to river fine aggregate, such as fine aggregate from offshore sources. Furthermore, fine aggregate has been produced. Considering that the durability, workability, and strength of concrete are all influenced by the physical and chemical qualities of fine aggregate, fine aggregate is an element that is of the utmost importance in both concrete and cement motor. In most cases, river fine aggregate or pit fine aggregate is utilized as fine aggregate4 bin mortar and concrete. Together, fine and coarse aggregate constitute around 75–80 percent of the total volume of concrete. As a result, it is of utmost importance to locate high-quality and acceptable aggregate in close proximity to the site. Due to the fact that natural fine aggregate is becoming an extremely expensive resource as a result of its demand in the building industry, research has begun to look for alternative materials that are both inexpensive and readily available as a replacement for natural fine aggregate. At this point, there have been several alternate materials utilized. Even though shore fine aggregate is used in many countries, including the United Kingdom, Sri Lanka, continental Europe, India, and Singapore, the majority of data about the use of this alternative found that it was employed in the building industry to a significantly lesser amount[1].

It is possible that natural fine aggregate could be substituted for hazardous waste that is disposed of in landfills. The word is sitting over a landfill. Concrete must serve as the foundation for any construction endeavor, regardless of the position, location, scale, or type of any project. In point of fact, concrete is the second most widely consumed substance after water, with over a hundred and fifty tons being consumed annually by each individual on the planet. It is estimated that the annual consumption of concrete in India is 450 million cubic meters, which is equivalent to approximately one ton of concrete. Do we have sufficient fine aggregate to produce concrete and mortar? We still have a long way to go before we reach global consumption levels, but have we reached that point yet? Even though the economy was slowing down, the value of the construction industry continued to grow at a steady pace of 15% yearly, and it contributed to 7-8% of the countries by that amount. Considering that GDP (at present prices) has been at the same level for the previous eight years, it is getting increasingly unsettling for people like regular people who talk about greening the sector to have no practical response to his extremely important question. We have, in point of fact, been sitting on a landfill full of potential alternatives to fine aggregate. industrial waste by products practically all industries, which have been rising dangerous problem both for the environment and agricultural and for the health of women, and have significant used in construction activity, which may be used full for not only from the point of view of the economy but also took reserve for the environment. As a result of its capacity to be cast in any form and shape, concrete is the construction material that is utilized the most all over the world. Brick and stone masonry are two examples of the types of buildings that can be replaced with this material. Concrete's strength and durability can be altered by modifying its constituents, such as cementitious material, aggregate, and water, as well as by incorporating a few unique components. All of these modifications can be made. As a result, concrete is an excellent material for a varied assortment of uses[2]. The following is a list of the shortcomings that concrete possesses:

1) A lack of tensile strength
2) A limited capacity for post-cracking; 3) Brittleness and a low ductility
4) A short duration of weariness
5) Unable to accommodate significant deformations in the body
6) Low resistance to impact

Plain concrete has a natural tendency to be weak due to the presence of micro cracks at the interface between the mortar and the aggregate. By incorporating steel fibers into the mixture, it is possible to eliminate the weakness. The incorporation of steel fiber into the concrete mixture is intended to strengthen the material's toughness, or its capacity to withstand the development of cracks. Loads are transferred at the internal micro fractures with the assistance of the steel fibers. Steel fiber-reinforced concrete (SFRC) is the name given to this type of concrete.

II. Related Work

Prashant Y. Pawade, Naga rnaik P.B., and Pande A.M.3 et.el conducted a series of compression tests on 150mm cube and 150mmØ, 300mm height, cylindrical specimens using a modified test method that gave the complete compressive strength, static, dynamic modulus of elasticity, ultrasonic pulse velocity, and stress-strain behavior using silica fume with and without steel fiber of volume fractions 0, 0.5, 1.0, and 1.5 percent, of 0.5mm Ø of aspect ratio of 60 on Portland Pozzolona cement concrete. The aim of these tests was to determine the behavior of the specimens under stress and strain. The combination of steel fibers, silica fume, and cement has resulted in the production of a robust composite material that possesses superior fracture resistance, increased ductility, and strength behavior prior to failure. The incorporation of fibers resulted in improved performance for cement-based composites. On the other hand, the incorporation of silica fume into the composites has the potential to regulate the fiber dispersion and strength losses that are produced by fibers. Additionally, the dense calcium-silicate-hydrate gel can increase both the strength and the binding between the fiber and the matrix. According to the results of the experiments, the results that were anticipated using mathematically modeled expressions are in excellent agreement with the results. The statistical model has been built by employing regression analysis on a substantial number of experimental results as the basis for its development. On the 28th and 90th day of curing, it was discovered that the proposed model had a high degree of accuracy when it came to estimating the interdependence [3].

A.M. Shendel et. el proposed an experiment to explore the compressive strength, flexural strength, and split tensile strength of steel fiber reinforced concrete (SFRC) comprising fibers of 0%, 1%, 2%, and 3% volume fraction of hook Tain, a critical investigation using M-40 grade concrete with a mix proportion of 1:1.43:3.04 and a water cement ratio of 0.35 was conducted. In this study, steel fibers with aspect ratios of 50, 60, and 67 were utilized. The data acquired from the results have been evaluated and compared with a control specimen that has no fiber. A relationship between aspect ratio vs. Compressive strength, aspect ratio vs. flexural strength, aspect ratio vs. Split tensile strength depicted visually. A clear indication of the percentage rise in 28 days is provided by the result data. For the M-40 grade of concrete, the compressive strength, flexural strength, and split tensile strength are all measured. Plain concrete has a natural tendency to be weak due to the presence of micro cracks at the interface between the mortar and the aggregate. By incorporating fibers into the mixture, it is possible to eliminate the weakness. In order to boost the toughness of the concrete mixture, which is the capacity to resist the growth of cracks, various types of fibers, such as those that are used in traditional composite materials, can be incorporated into the mixture. Loads are transferred at the internal micro fissures with the assistance of the fibers. The term "fiber-reinforced concrete" (FRC) refers to this type of concrete [4].

K. Vamshi Krishna and J. Venkateswara Rao. Et. el proposed experimental research of the mechanical properties of M20 grade concrete is the subject of this paper. The investigation was carried out by introducing polyester fibers into the mixture. Fibers of polyester are added to the mixture at percentages of 0.1%, 0.2%, 0.3%, and 0.4% by weight of cement, respectively. In terms of compressive, split tensile, and flexural strengths, a comparative examination has been carried out from the perspective of ordinary concrete to that of fiber reinforced concrete. Compressive, split tensile, and flexural strengths are all increasing proportionally as the fiber content within the material increases. It has been determined that the optimal dosage of fibers in cement is 0.3% of the total weight of the cement. It has been discovered that cutting the thickness of the pavement by twenty percent can be accomplished with a fiber content of three percent [5].

Dr. B. G. Vishnu Ram, Vasudeva R et. el proposed a method to increasing understanding of the benefits that may be gained from utilizing fiber reinforcing techniques in the building industry. The relatively low tensile strength and deformation qualities of concrete have spurred a large number of researchers to focus on improving these features. Concrete possesses a number of desired properties, however these properties are very low. The addition of fiber reinforcement to the concrete matrix is one method that has been developed with the purpose of enhancing or changing the brittle properties of concrete. The superior mechanical performance of steel fiber reinforced concrete in comparison to that of traditional concrete has contributed to the material's meteoric rise in popularity. Cement and steel production both have a number of negative effects on the environment that are caused by their production. It is unavoidable to consider sustainable development, which may be accomplished by either reducing the amount of garbage produced or by recycling it. The purpose of this research is to conduct a comparison analysis between regular reinforced concrete and steel fiber reinforced concrete. In the course of the research, the turn fibers were utilized as the research material. They were the leftovers from the companies that made lathes. In order to investigate the compressive and tensile behavior of composite concrete with varied percentages of such fibers added to it, experimental studies and analysis of the results were carried out. The M20 and M30 concrete mixes were used, and the percentage of fibers in the mix varied from 0% to 1%, with the percentages ranging from 0% to 0.25 to 0.75 to 1%. Through the examination of the outcomes of the tests, it was determined that the concrete using turn steel fibers exhibited superior performance in comparison to the concrete containing conventional steel fibers that were easily accessible in the market. It would not be difficult for the average person to include these environmentally friendly enhancements or alterations into their traditional building practices [6].

Vasudeva R, Dr. B. G. Vishnu Ram, et. el proposed a method the construction business, there is a growing awareness of the potential advantages that may be obtained through the utilization of fiber reinforcing techniques all over the world. Due to the comparatively low tensile strength and deformation capabilities of concrete, a significant number of researchers have been concentrating their efforts on enhancing these respective characteristics. However, despite the fact that concrete possesses a variety of desirable features, these properties are extremely restricted. One of the methods that has been developed with the intention of enhancing or altering the brittle characteristics of concrete is the incorporation of fiber reinforcement into the matrix of the concrete. A significant factor that has contributed to the meteoric rise in popularity of steel fiber reinforced concrete is the material's improved mechanical performance in compared to that of conventional concrete. manufacture of cement and steel both have a variety of adverse effects on the environment that are induced by its manufacture. These effects are created by the material itself. Taking into consideration sustainable development is something that cannot be avoided. This may be accomplished by either lowering the quantity of waste that is created or by recycling the garbage that is produced. The objective of this study is to explore the similarities and differences between normal reinforced concrete and steel fiber reinforced concrete through the use of comparative analysis. Additionally, the turn fibers were utilized as the research material during the duration of the investigation. The firms that manufactured lathes had made them, and they were the leftovers. The purpose of conducting experimental investigations and doing an analysis of the data was to explore the compressive and tensile behavior of composite concrete that had varying percentages of such fibers added to it. Both the M20 and M30 concrete mixes were utilized, and the percentage of fibers present in the mix ranged from 0% to 1%, with the percentages falling somewhere in the range of 0% to 0.25 to 0.75 to 1% over the course of the experiment. The results of the tests were analyzed, and it was found that the concrete that contained turn steel fibers performed significantly better than the concrete that contained conventional steel fibers, which was readily available on the market. This was determined by comparing the two types of concrete. To incorporate these environmentally friendly additions or modifications into their conventional building processes would not be a tough task for the average person to accomplish [7].

III. METHODOLOGY

The primary objective of the testing is to gain an understanding of the behavior of reinforced concrete (FRC) in both its fresh and hardened states. Steel fiber is added to concrete in varying percentages, ranging from 0% to 1.5%, with 0% being the lowest and 0.5% being the most. The following were the primary parameters that were investigated:

1. Workability of fresh concrete (slum and compaction factor and vee-bee test)
2. Cube compressive strength
3. Spilt tensile strength
4. Density of concrete
5. Modulus of elasticity of concrete

In the present study, an OPC 43 grade cement conforming to IS: 8112 from a single batch is used. The properties of cement used are shown in table 3.1 The Locally available river fine aggregate belonging to zone 2 of IS 383-1970 is used for the present study. The sieve analysis data of fine aggregate are shown in table 3.2 and the Crushed ballast stone of size 12mm and 20mm down confirming to IS 383 - 1970 is used as coarse aggregate and properties are tested and tabulated in table 3.4 and table 3.5. The Potable water is used in the present investigation for both casting and curing and its pH ranges between 6.5 – 8.5. Further, the following materials have been used in the present investigation.

1. Super plasticizer conforming to IS:9103-1999
2. FOSROC Conplast SP 430 DIS (Sulphonated Napthalene Formaldehyde)
3. Steel Fiber type = low carbon cold drawn
4. Wire type = steel fiber
5. Length = 50mm
6. Dia = 1.0mm
7. Aspect ratio = 50mm
8. Tensile strength = >1100 N/mm^2
9. Fiber shape = undulated along length

A. Mix proportion of concrete:

Mix design was carried out using the proportions of ingredients for M20 grade as per IS 10262- 2009; "GUIDELINES FOR CONCRETE MIX DESIGN PROPORTIONIGN" gives the minimum cement content. Mix design calculations has been shown in appendix- A and mix proportions for different mixes used are shown in Table 3.9

B. Casting of concrete cube and cylindrical mould:

Cube moulds of size 150mmX150mmX150mm and cylindrical mould of size 150mm dia. and 300mm length are used for casting the concrete. The moulds are cleaned and before casting greasing to be applied on all the internal surfaces. All the cube moulds are filled in 3 layers. The heights of the mould and for each layer 1/3 rd of each layer 25 blows are given with the help of tamping rod over the entire cross section of the mould uniformly. After filling and compacting the mould, the top surface is made smooth and kept for drying for 18 hours. Steel fiber by weight of cement 0%, 0.5%, 1.0%, and 1.5% are designated as 1SF0, 1SF0.5, 1SF1.0, 1SF1.5. Three cylindrical and cube moulds are casted for each percentage of steel fibers. A total no of 24 moulds are casted with W/c 0.4 for 0%, 0.5%, 1.0%, and 1.5% of steel fibers by weight of cement for 7 and 28-day compression and split tensile testing. Batching, Mixing and Preparation of concrete are shown in plate 3.1 and 3.2

IV. RESULTS AND DISCUSSIONS

In the present study, the observations are recorded for the slump, compaction factor and vee-bee Consistometer test values for fresh concrete and compressive Strength test, Splitting tensile strength test, density and elastic modulus values for hardened concrete. These observation lead to the study of mix proportion of OPC 43 grade cement using cold drawn steel fiber with super plasticizer.

In the fresh state workability measurements are done using slump test, compaction factor test and vee-bee Consistometer test. From the compaction factor test it can be observed that workability of fresh concrete decreased with the addition of steel fiber. Slump values are 12 to 18, compaction factor values are 0.85 to 0.91, and vee-bee seconds 7 to 15 are obtained. The slump, compaction factor and density values are recorded in table 3.8. The test results of cube compressive strength of all mixes is recorded in table 5.6 the variation of cube compressive strength with age is shown in figure F5L it can be seen that concrete has the steel fiber percentage increases there is increase in compressive strength. Density values are also calculated in hardened state. Density of concrete is 23.04 kN/m3 to 24.11 kN/m3. From the observed results in the table the variation of compressive strength with the steel fiber percentage for the concrete, as the steel fiber percentage increases there is increase in compressive strength. An increase of 33.33% in 28 days for ratio 0.4.

Cylindrical splitting tensile test also sometimes referred as, "Brazilian Test". As shown in below figure shows the test specimen and the stress pattern in the cylinder respectively. The test results of split tensile strength test is recorded in table 5.8 The variation of split tensile strength of specimen with age is shown in figure F5M. It can be seen that concrete has the steel fiber percentage increases there is increase in split tensile strength. Density values are also calculated in hardened state. Density of concrete is 21.42 KN/m3 to 23.74 KN/m3. From the observed results in the table the variation of split tensile strength with the steel fiber percentage for the concrete, as the steel fiber percentage increases there is increase in split tensile strength.

Modulus of elasticity of concrete would be a property for the case when material treated as elastic. Modulus of elasticity is primarily influenced by the condition of curing and age of the concrete, the mix proportion and type of cement. Modulus of elasticity is normally related to the compressive strength of concrete. Obtained modulus of elasticity is 22399.77 to 25416.53 N/mm2.

$$\text{Modulus of elasticity} = 5000\sqrt{fck}\ (N/mm^2)$$

Flexural strength of the concrete can be defined as the strength of the concrete against abrasion and it may be due to scraping or sliding. Flexural strength of the concrete increases with increase in compressive strength of concrete. Flexural strength is one measure of the tensile strength of concrete. It is a measure of an unreinforced concrete beam or slab to resist failure in bending. It is measured by loading 6 x 6-inch (150 x150) mm concrete beams with a span length of at least three times the depth.

$$\text{Flexural Strength, fcr} = 0.7\sqrt{fck}\ (N/mm^2)$$

TABLE 1: Properties of Cement

Sl. No.	Properties	Results
1	Specific gravity	3.15
2	Fineness of cement	6%
3	Normal consistency	28%
4	Initial setting time	30 min
5	Final setting time	600 min.

TABLE 2: Sieve Analysis of Fine Aggregates

Sl. No.	IS sieve size (mm)	Cumulative % passing
1	4.75	82.7
2	2.36	73.5
3	1.18	61.9
4	600	45.2
5	300	12.3
6	150	2

TABLE 3: Properties of Fine Aggregates

Sl. No.	Properties	Results
1	Bulking of fine aggregate	26%
2	Specific gravity	2.6
3	Bulk density	1.63 kg/m^3

TABLE 4: Sieve Analysis 20 mm down size coarse aggregates

Sl. No.	IS sieve size (mm)	Cumulative % passing
1	20	80.4
2	12.5	80.93
3	10	2.03
4	4.75	0.63

TABLE 5: Sieve Analysis 12 mm down size coarse aggregates

Sl. No.	IS sieve size (mm)	Cumulative % passing
1	12.5	91.10
2	10	49.65
3	4.75	0.40

TABLE 6: Properties of coarse aggregates

Sl. No.	Properties	Results
1	Specific gravity	2.7
2	Bulk density	1.68 kg/ltr
3	Percentage of voids	37.78%

TABLE 7: For w/c ratio 0.4 mix proportion for different mixes

Steel fibre (%)		Cement (kg/m^3)	Fine aggregate (kg/m^3)	Coarse Aggregate (kg/m^3)		Steel fibre (kg) (% by wt. of cement)
				12mm	20mm	
1SF0	Weight (kg)	370	721	488.2	732.6	0
	Proportion	1	1.94	1.32	1.98	
1SF0.5	Weight (kg)	370	721	488.2	732.6	1.85
	Proportion	1	1.94	1.32	1.98	
1SF1.0	Weight (kg)	370	721	488.2	732.6	3.70
	Proportion	1	1.94	1.32	1.98	
1SF1.5	Weight (kg)	370	721	488.2	732.6	5.55
	Proportion	1	1.94	1.32	1.98	

TABLE 8: Workability of Fresh Concrete

Designation	Slump* (mm)	Compaction factor*	Vee-bee seconds*
1SF0	25	0.91	7
1SF0.5	20	0.91	8
1SF1.0	18	0.85	13
1SF1.5	15	0.89	15

TABLE 9: Cube Compressive Strength

Designation	Cube Compressive Strength* (N/mm^2)	
	7 Days	28 Days
1SF0	20.00	34.00
1SF0.5	26.00	35.48
1SF1.0	29.41	35.55
1SF1.5	25.03	34.33

TABLE 10: Hardened concrete properties of Cube Specimens

Designation	7-day			28-day		
	Density* (KN/m^3)	Elastic modulus* (N/mm^2)	Flexural Strength (N/mm^2)	Density* (KN/m^3)	Elastic modulus* (N/mm^2)	Flexural Strength (N/mm^2)
1SF0	23.58	22360.68	3.13	23.04	29154.76	4.08
1SF0.5	24.13	25495.10	3.57	23.40	29782.55	4.16
1SF1.0	24.11	27115.50	3.80	23.98	29811.91	4.17
1SF1.5	23.66	25015.00	3.50	23.85	29295.90	4.10

TABLE 11: Split Tensile Strength

Designation	Split Tensile Strength * (N/mm^2)	
	7 Days	28 Days
1SF0	2.55	3.00
1SF0.5	3.16	5.00
1SF1.0	3.30	4.24
1SF1.5	2.85	4.88

TABLE 12: Hardened concrete properties of Cylindrical Specimens

Designation	7 day	28 days
	Density* (KN/m^3)	
1SF0	23.74	21.42
1SF0.5	23.40	23.09
1SF1.0	23.34	23.15
1SF1.5	23.63	23.17

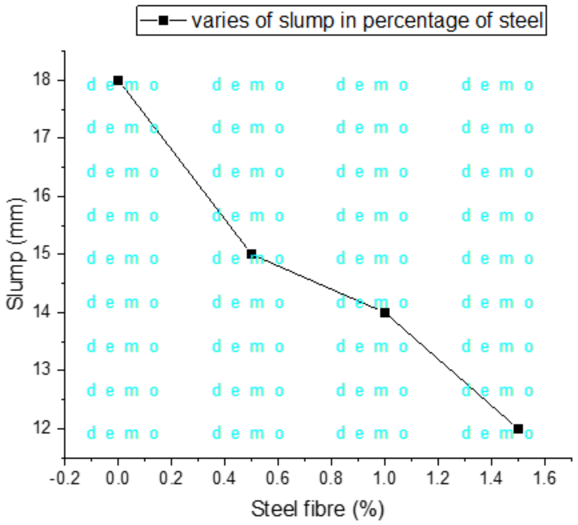

Figure 1: Slump v/s Percentage of steel fibre

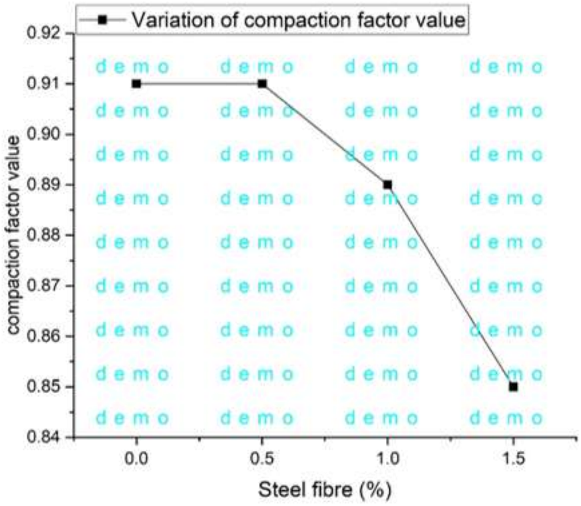

Figure 2: Compaction factor v/s Percentage of steel fibre

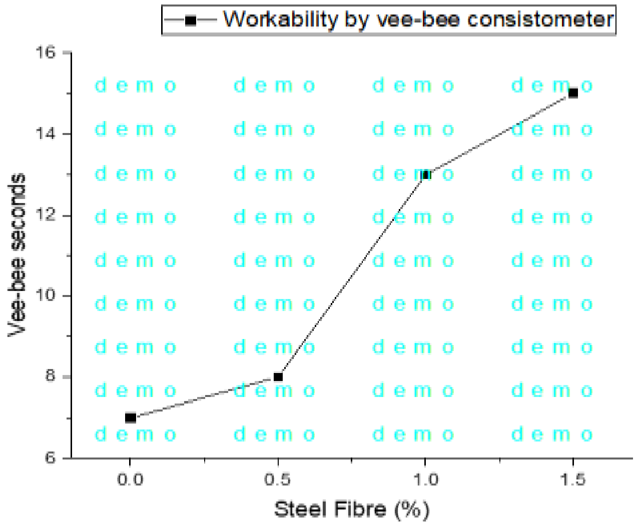

Figure 3: Vee-Bee Seconds v/s Percentage of steel fibre

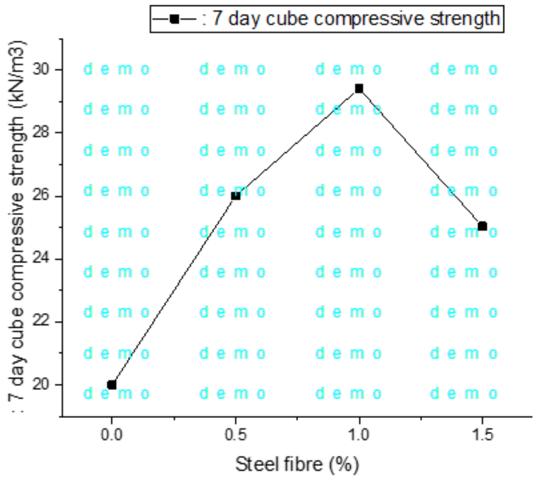

Figure 4: 7-day Cube Compressive Strength v/s Percentage of steel fibre

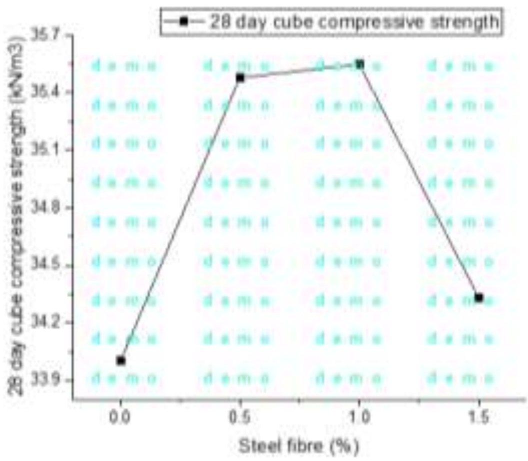

Figure 5: 28-day Cube Compressive Strength v/s Percentage of steel fibre

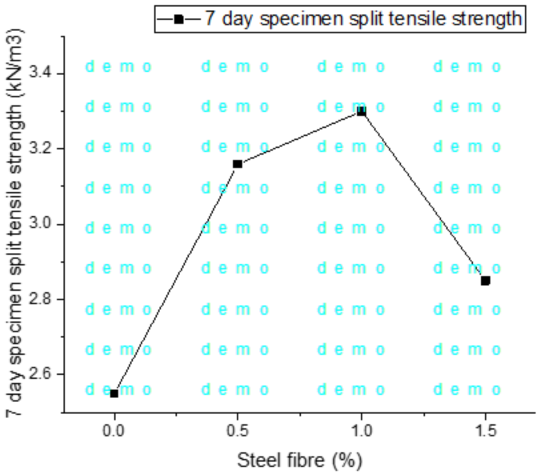

Figure 6: 7-day Specimen Split Tensile Strength v/s Percentage of steel fibre

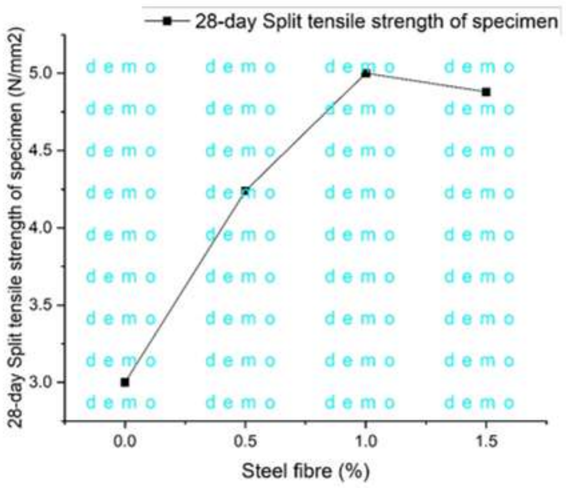

Figure 7: 28-day Specimen Split Tensile Strength v/s Percentage of steel fibre

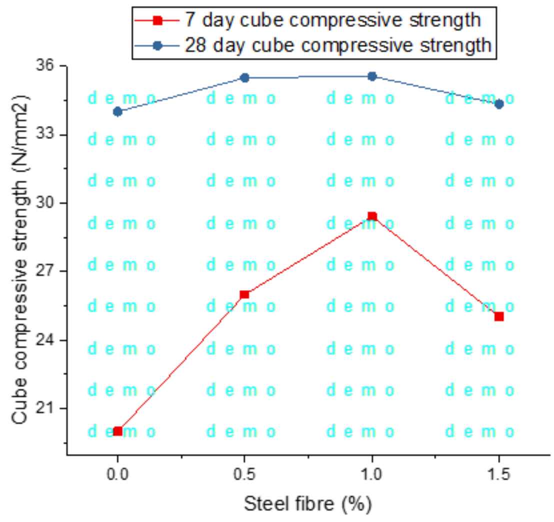

Figure 8: Cube Compressive Strength of 7 and 28 day Test Result

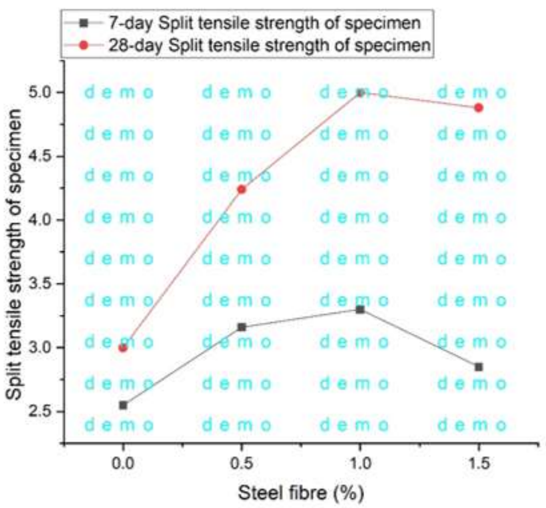

Figure 9: Split Tensile Strength of 7 and 28 day Test Result

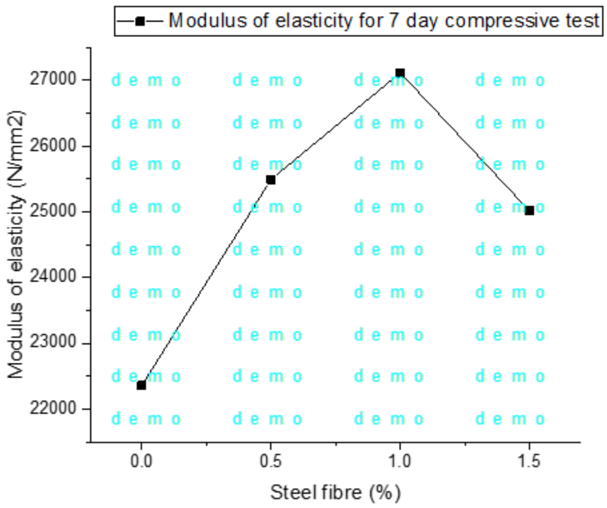

Figure 10: Modulus of Elasticity v/s Percentage of Rubber for 7-day Compressive Test

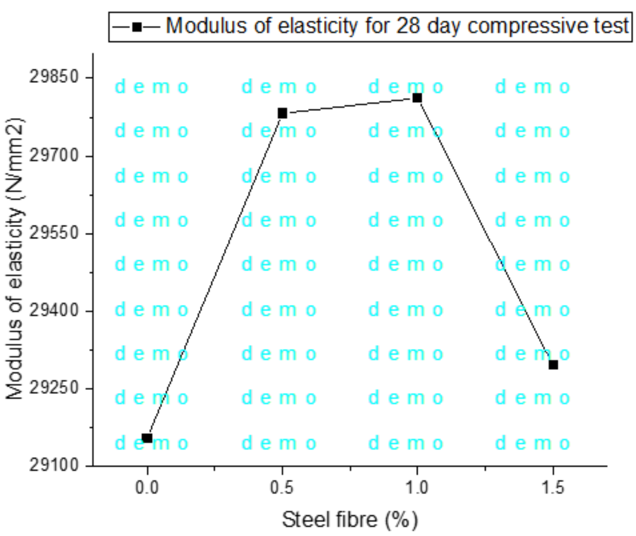

Figure 11: 28-day Cube Compressive Strength v/s Percentage of steel fibre

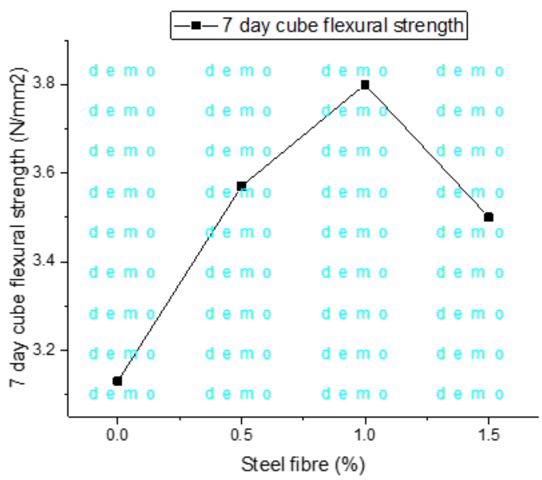

Figure 12: 7-day Flexural Strength of Cube v/s Percentage of steel fibre

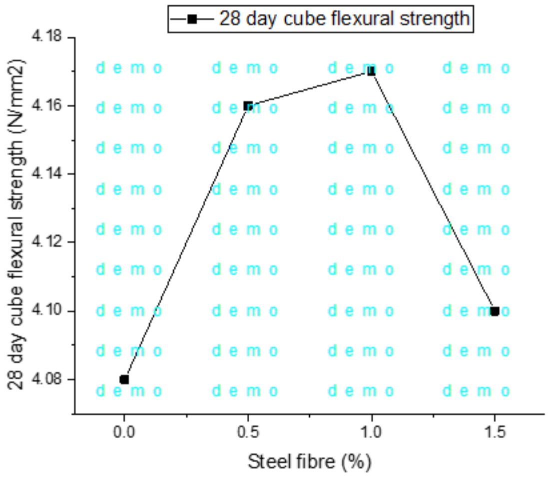

Figure 13: 28-day Flexural Strength of Cube v/s percentage of steel fibre

V. CONCLUSIONS

Following conclusions are drawn from limited experimental investigations carried out in the present study.

- Workability of concrete decreases with increase in percentage of steel fibre by weight of cement.
- Density of conventional concrete varied from 23.1 to 24.0 KN/m² and for SFRC with addition 1% steel fibre by weight of cement density varied from 23.1 to 24.15 N/m².
- For 1% addition of steel fibre by weight of cement the maximum cube compressive strength for 7-day and 28-days has been observed.
- Maximum cube compressive strength conventional concrete for 7-day and 28-day are 20 N/mm² and 34 N/mm² respectively.
- For 1% addition steel fibre by weight of cement the ultimate cube compressive strength for 7-day and 28-days are 29.41 and 35.55 N/mm² respectively has been observed.
- For 1% addition of Steel fibre by weight of cement the compressive strength increases by 47.05% and 4.55% in 7 day and 28 day respectively for w/c ratio 0.4 as compared to conventional concrete.
- For 1% addition of steel fibre by weight of cement the maximum split tensile strength for 7-day and 28-days has been observed.
- Maximum split tensile strength of conventional concrete for 7-day and 28-days are 2.55 N/mm² and 3.0 N/mm² respectively.
- For 1% addition steel fibre by weight of cement the ultimate split tensile strength for 7-day and 28-days are 3.3 N/mm² and 5.0 N/mm² respectively has been observed.
- For 1% addition of Steel fibre by weight of cement the Splitting tensile strength increases by 29.41% and 66.67% In 7 day and 28 day respectively for w/c ratio 0.4 compared to conventional concrete.
- For 1% addition of steel fibre by weight of cement the maximum elastic modulus and flexural strength has been observed by calculation.
- For 28-days, Elastic modulus for conventional concrete is 29.155 N/mm² and for 1% addition of steel fibre by weight of cement the elastic modulus is 29.822 N/mm².
- For 28-days, Flexural strength for conventional concrete is 4.08N/mm^2 and 1% addition of steel fibre by weight of cement the flexural strength is 4.17N/mm²

By observing above tabulated test results we can conclude that, the fibre reinforced concrete with 1% addition of steel fibre by weight of cement the Compressive strength, split tensile strength and Elastic modulus Flexural strength of concrete has been increased when compare to conventional concrete. The study can be further extended on understanding the behaviour of

1. Fibre reinforced concrete for fibre of different aspect ratio, shape and for different material.
2. Durability studies can be carried for SFRC.
3. By using mineral admixture, the cement content in the concrete can be minimized.

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