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Exploratory Studies Were Performed to Determine the Behavior, Strength and Specific Properties of Fiber-Glass Driven Concrete that Contain Marble Powder Instead of Cement in Part

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ABSTRACT

Concrete has internal microcracks and due to these microcracks weakening in the case of simple deposition of the solid solution increases the strength of the concrete. This damage can be corrected by adding fibers to the cement. A large amount of fiber is embedded in the concrete which improves the tensile properties of the concrete, crack resistance, stiffness, strength and durability. Iron fiber has been used in many studies and researches, but due to the presence of glass fiber and corrosion problems, iron fiber has not been used in recent years. An experimental study was performed to find out the behavior, strength and specific properties of fiberglass-driven concrete containing marble powder as a partial substitute for cement. Mixture for quality concrete M25 has been developed. The different proportions of marble powder instead of cement are 5, 10, 15 and 20. Glass fiber is added to each mix at a rate of 0.5% depending on the amount of cement. Recommended compressive and tensile strength for hardened concrete according to Indian standards (IS). The best results found are presented in this study. This study clearly shows that the effect of glass fiber and marble powder increases the strength of concrete.

1. INTRODUCTION

The environmental impact of concrete may not be a completely negative result. Concrete is one of the major contributors to greenhouse gas emissions. Concrete is rapidly being used in buildings that have reached the end of their useful life. Due to its low calorific value and porosity, concrete works efficiently and effectively using energy-saving construction technology that combines concrete with mortar, strength, durability, performance and common physicochemical properties. I want to change the properties to fit everything. It is important to control the cost of cement and cement coatings. One solution is to use matching in this situation. The use of porcelain for cement is a response to today's concrete assembly

2. FRC CONCRETE

Definition

This concrete is a fibrous material that improves structural integrity. It consists of individual short fibers, evenly spaced and randomly oriented. It is characterized by a combination of four different phases: cement, coarse aggregate, fine material and water. Amalgam and porcelain can also be included. Preservative,used in concrete. Fibers are generally cheaper than hand-glued glass, steel or plastic reinforcement, and the tensile strength is increased several times.

Fibers in concrete

Typically, fiber-reinforced concrete is used for the treatment of ductile and dry shrinkage cracks. It also reduces the permeability of concrete and hence reduces water seepage. Certain fibers provide large impact on concrete, resistance to wear and breakage. The fibers generally do not increase the elastic strength of the concrete, so they cannot be stable at the moment and cannot change the steel reinforcement. Some fibers reduce the strength of concrete.

Fiber Content

The fibers added to the concrete mix are usually measured as a percentage of the total volume. This is called a volume fraction (HF). The volume fraction is usually between 0.1 and 3%

Essential fiber Reinforced Concrete

- Fibers increase the tensile strength of the concrete.
- FRC improves the performance of concrete.
- Reduces air gap as well as water gap.
- Fibers such the graphite and glass has excellent slip resistance. This amount is also due to the fact that the different types of fibers intended to be used are required for the tendon's creep characteristics.
- Adding well-spaced and evenly distributed fibers to concrete helps to reduce cracks and improve its dynamic properties.

Different Fibers

Fibers are usually made of different materials in different shapes and sizes. Fiber is represented by a numerical parameter known as aspect ratio, i.e. the 1/d ratio, which means the length of the fiber cleave by the diameter.

Classification of fiber reinforced palpable

Various types of fibers commonly uses in the construction industry:

Steel Fiber Concrete - There are different types of steel fibers available for reinforcement. The most commonly used steel fiber is round steel fibers, which are usually obtained by cutting round wire into shorter lengths. The diameter varies from 0.25 mm to 0.75 mm. Suitable with low carbon steel filament.

That is: 280-1976 Wire diameter from 0.3 mm to 0.5 mm, basically used in India.

Figure 1 Steel fibers

Reinforced concrete with polypropylene fibers - Polypropylene is one of the cheapest and most affordable fibers. This type of fiber is resistant to most chemical attack. This type of fiber has a very high freezing point, about 165 °C. Since these filaments are hydrophobic, they generally do not require prolonged exposure throughout the mixture and therefore only need to be exposed evenly throughout the mixture.

Figure 2 Polypropylene fiber

Fiberglass Concrete - Fiberglass typically consists of 200-400 individual winds that are lightly combined to form a picture, then cut into several pieces or combined to form cloth or tape. In ordinary concrete, no more than 2% (by volume of fiber) along a length of 25 mm should be mixed by conventional methods.

Figure 3 Glass fiber

Asbestos Fiber Reinforced Concrete - Asbestos fiber is a billiard and natural use of fiber reinforced concrete. This type of fiber is efficiently used with portable embedded packaging in one of the most popular products. Fiber forms are the backbone of thermometers, with indications of the mechanics and chemistry of ignition and their construction into composite tubes. Bituminous roof tiles and corrugated iron roofs. To this relative length, add a length of fiber (10 mm) along the skull.

Figure 4 Asbestos fiber

Carbon fiber reinforced concrete. Carbon fiber is the latest and is arguably the most effective addition to the various types of fiber on the industry market. These types of fibers have very high elasticity and tensile strength. They are very expensive and their strength and toughness are superior to steel. One of the drawbacks is that it is usually covered because it is more fragile than fiberglass.

3. MATERIALS AND DESIGN METHODOLOGY

3.1 GENERAL

This section describes the test results for various materials. To achieve the purpose of the study, experiments were conducted to study the effects of glass fibers and marble powder on compressive stress and decomposition stress.

3.2 Material

In the production of concrete mixes, all required materials and properties are determined in the laboratory according to relevant practice standards. In addition to marble and fiberglass powder, cement, coarse aggregates and soft aggregates are also used. The purpose of testing all different types of materials is to check specifications and help engineers design concrete mixes with specific strengths. The various materials used in this study are interpreted as follows:

3.2.1 Portland Cement

All the materials needed for the concrete mix are necessary, and cement is the most important material because of its soft chain link. The second important function of cement is to first combine sand and stone and then fill the gaps between the stone and sand particles to form dense blocks. This only creates 20% of the total concrete mix. This is a suitable adhesive media component and is the only concrete component that can be scientifically controlled. The change in volume will affect the compressive strength of the concrete mixture. Ordinary Portland cement, also known as Portland cement, is the most commonly used and most important type of cement. A soft powder produced by crushing Portland cement clinker. According to its 28 -day strength, conventional Portland cement is divided into three types: 33, 43 and 53. It uses high -quality lime and advanced equipment to maintain better particle size distribution, better gradation and better packaging. You can improve the quality of cement. The production of quality cement is much more useful because it strengthens the concrete. The price can be very expensive compared to cheap cement, but it has many advantages and can save 10-20% of the cost of cement. Even strength can develop faster than low -quality cement.

In this study, supertechnical cement class 43 conventional cement was used in the study. Fresh cement, without lumps. Then store the cement carefully so as not to reduce performance due to moisture. The physical properties of cement were determined by various tests according to the Indian standard IS: 8112: 1989 {22} and are listed in Table 3.1.

S NO	**Characteristics**	**Values Obtained Experimentally**	**Values Specified by IS 8112:1989**
1	Specific Gravity	3.13	-
2	Standard consistency Percent	30	-
3	Initial Setting Time Minutes	45	30 (minimum)
4	Final Setting Time Minutes	210	600(Maximum)

3.2.2 Aggregate

In a concrete mix, the aggregate has a large volume and hence provides dimensional stability to the concrete. Often aggregates in two or more sizes are used to increase the density of the resulting mixture. Workability and homogeneity of the mixture is achieved by using fine aggregates. They help the solution to keep the larger aggregate particles in suspension. This results in a plastic mix and prevents the separation of large pasty aggregates, especially when concrete has to be transported from the mixing plant to the site. It is an extremely important part of the concrete mix, as they make up about 75% of the concrete mass. Therefore, it is very important that the aggregate meets certain requirements so that the concrete is practical, durable, durable and

Table 10 Sieve Analysis of Coarse aggregate

Weight of sample taken = 5000gm					
Sr. No.	**IS-Sieve**	**Weight Retained (gm)**	**% retained**	**% passing**	**Cumulative % retained**
1	80mm	0	0	100	0
2	40mm	150	3	97	3
3	20mm	530	10.6	86.4	13.6
4	10mm	4320	86.4	10.6	100
5	4.75mm	0	0	100	100
6	2.36mm	0	0	100	100
7	1.18mm	0	0	100	100
8	600micron	0	0	100	100
9	300micron	0	0	100	100
10	150micron	0	0	100	100
	Total	5000		SUM	716.6
				FM	7.16

Table 1 Sieve Analysis of Fine Aggregate (River Sand)

Weight of sample taken = 1000 gm					
Sr. No.	**IS-Sieve**	**Weight Retained(gm)**	**% retained**	**% passing**	**Cumulative % retained**
1	4.75mm	5	0.5	99.5	0.5
2	2.36mm	10	1	98.5	1.5
3	1.18mm	25	2.5	96	4
4	600 microns	290	29	67	33
5	300 microns	580	58	9	91

6	150 microns	90	9	0	100
7	Pan	0	0		
	Total	1000		SUM	230
				FM	2.3

Table 2 Sieve Analysis of Quarry Dust

Weight of Sample taken = 1000 gm					
Sr. No.	**IS-Sieve**	**Weight Retained (gm)**	**% retained**	**% passing**	**Cumulative % retained**
1	4.75mm	109	18.1	81.9	18.1
2	2.36mm	15	2.5	79.4	20.6
3	1.18mm	25	4.16	75.24	24.76
4	600 microns	40	6.67	68.57	31.43
5	300 microns	140	23.33	45.27	54.73
6	150 microns	250	41.67	3.6	96.4
7	Pan	21	3.5	0	
	Total	600		SUM	246.02
				FM	2.46

Figure 5 Sample of Quarry Dust

d) Marble powder: Marble powder was collected at Rajasthan Marbles, Dehradun. The color of the marble powder was white and air-dried like a pure powder. The marble powder is screened through a 4.75 mm sieve to determine the size module. The specific gravity of the marble chips was 2.17. The analysis of the site is presented in table 3.6.

Table 3 Sieve Analysis of Marble Powder

Weight of sample taken = 1000 GM					
Sr. No.	IS-Sieve	Weight Retained (GM)	% retained	% passing	Cumulative % retained
1	4.75mm	0	0	100	0
2	2.36mm	0	0	100	0
3	1.18mm	0	0	100	0
4	600 microns	5	5	95	5
5	300 microns	40	40	55	45
6	150 microns	55	55	0	100
7	Pan	0	0		
	Total	100		SUM	150
				FM	1.50

Most of the particle size of marble powder ranges from 150 microns to 600 microns. This study uses five different percentages of marble powder, i.e. 0%, 5%, 10%, 15% and 20%.

Figure 6 Sample of Marble Powder

e) Fiberglass. The glass fibers used are alkali resistant (AR) glass fibers. These are Cem-file anti-crack fibers with an aspect ratio of 857.14. The characteristics of the glass fiber obtained during manufacture are shown in Table 3.7.

Figure 7 Sample of Glass Fiber

Table 4 Sieve Analysis of Glass Fiber

Sr. No.	Properties	
1.	Corrosion Resistant	High
2.	Length	12 mm
3.	Specific Gravity	2.71
4.	Diameter	14 microns
5.	Alkaline Resistant	High
6.	Density	2700 kg/m^3
7.	Modulus of Elasticity	72 Gpa

3.2.3 Water

In this study, potable water was used to make concrete, which was available in a materials testing laboratory. Drinking water gives the best results when mixing and hardening concrete. The water was in good quantity and free of contamination.

3.3 Test methods

3.3.1 Specific gravity

Specific gravity is the ratio of the thickness of an object to the length of a reference letter. The ratio of the difference between the average cost of an asset and the average cost of a common asset is known as apparent gravity.

3.3.2 Routine inequality testing

A common slurry inequality is an inequality that allows the piston to enter 5-7 mm from the bottom of the rotating die.

3.3.3 First and Last Start Confirmation

The elapsed time from adding water to the cement until the needle does not penetrate the mold 5 ± 0.5 mm is called the initial paste time. The final installation time is the time elapsed from the addition of water to the cement until the ring becomes the final consideration for the mold. use wick device

3.3.4 Sieve analysis of coarse and fine aggregates according to IS: 383-1970

In order to evaluate the particle size distribution of the granular material, a sieve analysis procedure is performed. Particle size distribution is a very important property characteristic that describes the characteristics of a material. The sieve analysis process can be performed on any type of organic or inorganic material, including sand, dust, marble, soil grains and seeds. Due to its simplicity. This is one of the most commonly used methods.

Figure 8 Sieves for fine aggregates

3.3.5 Water absorption of coarse aggregate

The strength of the aggregate is determined by the amount of water absorption. Aggregates with higher water absorption are generally porous and considered unusable unless they give an acceptable result based on impact, strength and extended tests.

3.3.6 Crushing amount

The crushing amount of the unit provides a measure of resistance to fracture when a compressive load is gradually applied. Aggregates with a lower crushing ratio are considered to be of good quality, as they help to obtain the highest quality concrete.

3.3.7 Modulus of subtlety

The size modulus is used to determine the degree of aggregate uniformity. This is an empirical number that indicates the fineness of the placeholder. If the size modulus is high, then the aggregate is larger.

Figure 9 Vicat apparatus

Figure 10 Mixture machine of concrete

3.3.8 Test specimen preparation

Glass fiber is added to each admixture in the amount of 0.5% by volume of concrete, cement, coarse aggregate, fine aggregate, water and marble powder, ie when the proportion of marble dust in each admixture is different. otherwise. Replacement cement must be weighed and added separately. Mix cement powder and marble to dry. First, add coarse filler and water to the mixer. A fine aggregate (barrier powder) was added, and then cement marble powder with the remaining water. Then mix the ingredients in a blender for 4-5 minutes, then add the fiberglass to the mixture. Then stir in the mixer for a few minutes until a smooth mixture is obtained. Then pour the concrete into a cube, press the concrete into three layers of 25 mm pitch and 16 mm rod and shake vigorously to press well. Use a spatula to trace the concrete over the form. All samples were ventilated for 24 h. After 24 h, the sample was removed from the mold and placed in a culture vessel filled with experimental drinking water. Samples of each mixture were prepared and fed for 7 and 28 days in an incubator.

3.3.9 Compressive strength of concrete

The compressive strength test is one of the most important tests that provides an overview of all the properties of cement. This test will help determine if the concrete injection has been successful. A digital compression tester determines the compressive strength of a concrete cube. The test was performed on a standard cube measuring 150 mm x 150 mm x 150 mm. The cubes were stored in an incubator container for 7-28 days. It is tested when the cube is removed from the water. The surface is scraped and the sample is tested. The cube is stored in the compression tester. Then start the engine and continue using the load until the specimen breaks and the compressive strength is fixed.

Figure 11 Digital Compression Testing Machine

3.3.10 Concrete breaking strength during separation:

To calculate the tension strength of the concrete at a separate tension, cylinders were cast with dimensions of 150 mm by 300 mm. The cylinder that was tested were evenly spaced. The samples were poured and kept in a hardening vessel for 28 days and then tested. The test was performed on a digital compression testing machine. The tensile stress (T) of the sample under the applied load was calculated using the formula.

$T = SP / \pi dl$

Where T = tensile strength divided by MPa

P = applied load

D = diameter of the sample cylinder in mm

l = length of the sample cylinder in mm

An amount of fiberglass equal to 0.5% of the volume fraction of concrete is added to each mixture. Cement, coarse aggregate, fine aggregate, water and marble powder of each mixture, i.e. different proportions of substitution of marble cement powder, were weighed and added separately. Cement and marble powder were mixed and dried. First, coarse aggregate and a small amount of water were added to the mixer. After adding fine aggregate (quarry powder), marble powder cement was added to the remaining amount of water. The mixture was then mixed well with a mixer for 4-5 minutes. The glass fibers were then added to the mixture and then the mixer was rotated for 2-3 minutes to make a homogeneous mixture. Next, the concrete was poured into a cylindrical shape, and the concrete was compressed into three layers with a 25 mm stroke of a 16 mm rod. The cylinder was then vibrated to ensure a proper seal. I used a propeller to bring the concrete surface to the top of the mold. All samples were allowed to solidify in air for 24 hours. After 24 hours, the sample was removed from the mold and stored in the laboratory in a medicated water tank filled with drinking water. Samples were prepared and each mixture was cured in a drug tank for 28 days.

Figure 12 Preparation of specimens

Figure 13 Cylinders have been tested for split tensile strength in CTM

Figure 14 Specimens after testing

3.3.11 Mixture proportioning

In this study, type M25 concrete was prepared. It was developed in accordance with the Indian standard IS10262-2009 [10]. The total cement content was 383.2 kg / m3 with a water-cement ratio of 0.5. Fiberglass in an amount of 0.5% by volume of concrete is added to marble powder with different percentages: 0%, 5%, 10%, 15% and 20%. The ratio of the components is shown in table 3.8.

Table 5 Mix Design

Specifications	Cement	Fine Aggregate	Coarse Aggregate	Water
Quantity	383.2kg/m^3	765.42kg/m^3	1039.02kg/m^3	191.2kg/m^3
Ratio	1	1.99	2.71	0.5

3.3.12 Calculation of fiber content

The fiber content is taken as 0.5% by volume.

$$0.5\%\ byvolume = \frac{0.005\ Xunitweightoffibre}{0.995\ Xunitweightofconcrete} x\ 100 = \%\ byweight$$

We Know, Unit weight of fiber = 2700 kg/m^3
Unit weight of concrete = 2360 kg/m^3

$$0.5\%\ byvolume = \frac{0.005\ x\ 2700}{0.995\ x\ 2360} x\ 100 = 0.574\ \%\ byweight$$

Therefore,

$$0.5\%\ fibrebyvolume = \frac{\%\ byweight}{100} Xunitweightofconcrete in Kg/m^3$$

$$0.5\%\ fibrebyvolume = \frac{0.574\ x\ 2360}{100} = 13.54\ kg/m^3\ = 14kg/m^3(approx.)$$

Glass Fiber Content = 14 kg/m^3

4. RESULTS AND DISCUSSIONS

4.1 Generals

This chapter presents the results were obtained from the different types of tests were performed on the material. The objectives of this study were achieved by conducting all experimental studies that were planned to study effect of fiberglass with marble powder on the compression strength and tensile strength of concrete. Casting, hardening and testing of glass fibers - marble concrete samples were performed at different age. The experiment program mainly involved testing the properties of materials used in the manufacture of concrete. Design of the mixture, including casting and hardening of all samples. The tests were performed to determine the compressive strength and tensile strength of the glass fibers reinforced with marble powder with quarry powder as fine aggregate and the results were compared with a controlled mixture of M25 concrete with quarry powder as fine aggregate.

4.2 Results

4.2.1 Compressive strength

The compressive strength of all mixtures determined for hardening periods of 7 and 28 days. The test performed on a compression testing machine. First, the compressive strength of the sample cubes was determined by replacing the river sand with quarry dust for 3, 7 and 28 days. The test results are presented in table 4.1. Second, the compressive strength of the glass fiber cubes was determined at 0.5% together with the marble powder at 5%, 10%, 15%, 20% by replacement with cement and taking the quarry dust as aggregate. fine for 7 and 28 days

Table 6 Compressive strength in N/mm^2

Type of concrete	3 days	7 days	28 days
M25 with River Sand	10	17.83	25.9

M25 with Quarry Dust	14	25.3	36.86

Table 7 Compressive Strength with Glass Fiber and Marble powder for 7 days

Sr. No.	**Mix No.**	**% Marble Powder**	**% Glass Fiber**	**Mean Compressive Strength (N/mm^2)**
1	M1	0	0	25.3
2	M2	0	0.5	28.0
3	M3	5	0.5	31.6
4	M4	10	0.5	33.6
5	M5	15	0.5	29.4
6	M6	20	0.5	21.9

Table 8 Compressive strength with Glass Fiber and marble powder for 28 days

Sr. No.	Mix No.	% Marble Powder	% Glass Fiber	Mean Compressive strength (N/mm^2)
1	M1	0	0	36.86
2	M2	0	0.5	39.2
3	M3	5	0.5	43.9
4	M4	10	0.5	48.6
5	M5	15	0.5	38.8
6	M6	20	0.5	32.0

4.2.2 Breaking strength at tension

The tensile strength of all samples determined for 28 days. The test carried out on a compression testing machine. First of all, the tensile strength of the samples was obtained by replacing river sand with quarry dust. The results are shown in Table 4.4. Second, the tensile strength of cylindrical specimens was obtained with 0.5% fiberglass and 5%, 10%, 15% and 20% powder with replacing of cement and quarry twilight as a replacement for river sand in fine aggregates in the concrete mix. ... The results is shown in Table 4.5.

Table 9 Tensile strength divided by 28 days

Type of concrete	Split Tensile strength (N/mm^2)
M25 with river sand	
M25, with quarry dust	3.27

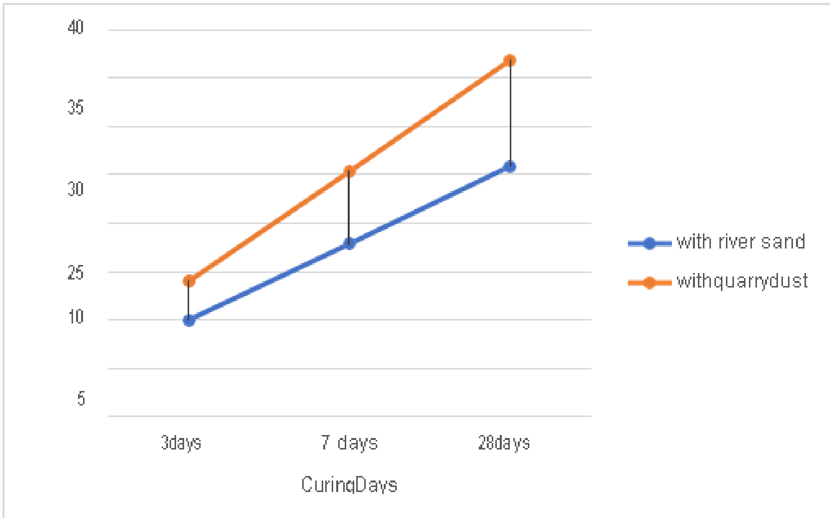
Table 10 Split tensile strength with glass fiber and marble powder for 28 days

Sr. No.	Mix No.	% Marble powder	% Glass Fiber	Average Split tensile strength (N/mm^2)
1	M1	0	0	3.27
2	M2	0	0.5	3.49
3	M3	5	0.5	3.72
4	M4	10	0.5	4.35
5	M5	15	0.5	3.33
6	M6	20	0.5	3.10

4.3 Discussions of results

4.3.1 Influence of quarry dust when replacing river sand with fine aggregates.

4.1 shows the change in compressive strength of the cube sample. The study found that the use of fine aggregate quarry dust to completely replace river sand can improve the compressive strength of concrete. Compressive force In about 28 days with river sand, it was found that it was 25.9 N / mm2, and with quarry dust - 36.86 N / mm2. The tensile strength also increases from 2.82 N / mm2 to 3.27 N / mm2 with the complete replacement of river sand with quarry dust.



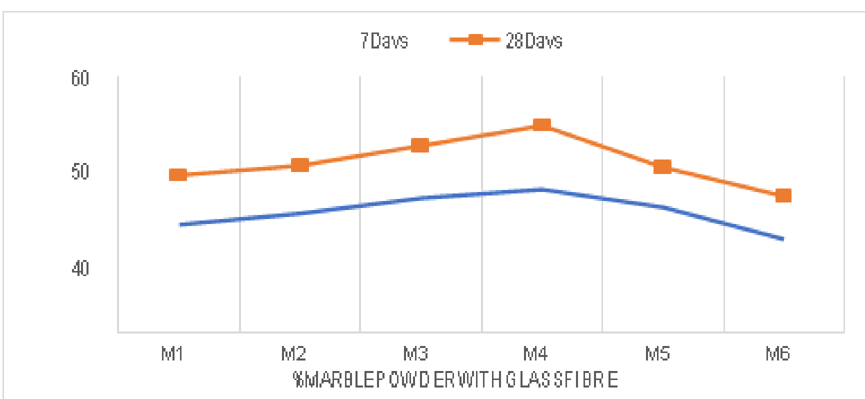
Graph 1 Variations in the compressive strength

4.3.2 Effect of Glass Fiber with Marble powder on Strength Characteristics

a) Effect on compressive strength

In fig. 4.2 shows change in strength of compressive a concrete mixture when, adding fiberglass and replacing cement with marble powder by different percentages. It observed that with Addition of fiberglass and marble powder (cement replacement) in different percentages, a increase in strength of compressive was first observed and then a decrease in strength compared to controlled concrete, which was achieved using glass. fibers with 0.5% and when replacing cement with 10% marble powder. The increase in strength may be due to the fact of marble granules have many cementing property , but at the same time they cannot replace cement to a large extent, and the addition of fiberglass helps to increase strength. Pozolanic activity, as well as the porous structure of the cementitious material, can be one of the reasons for the decrease of the concrete resistance. When the marble powder content is increase to 20% from 0.5% fiberglass, the strength decreases compared to

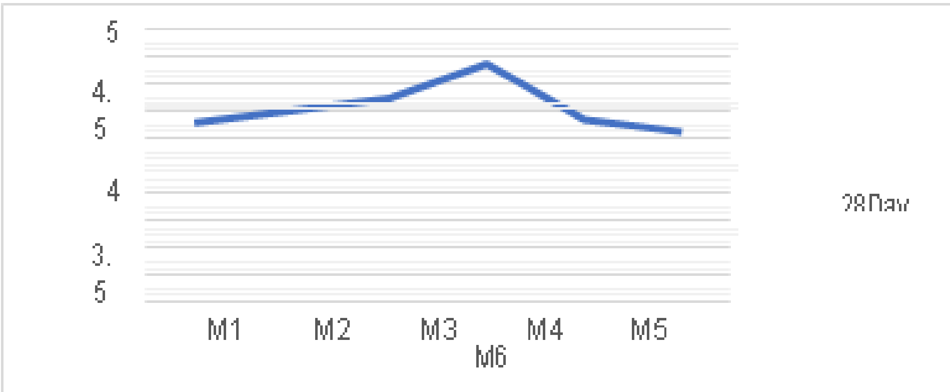
Controlled concrete. Table 4.6 shows Percentage increase and decrease in compressive strength compared to the controlled mixture.



Graph 2 Variations in compressive strength of concrete with glass fiber and differentiation percentage of marble powder

b) effect on tensile strength

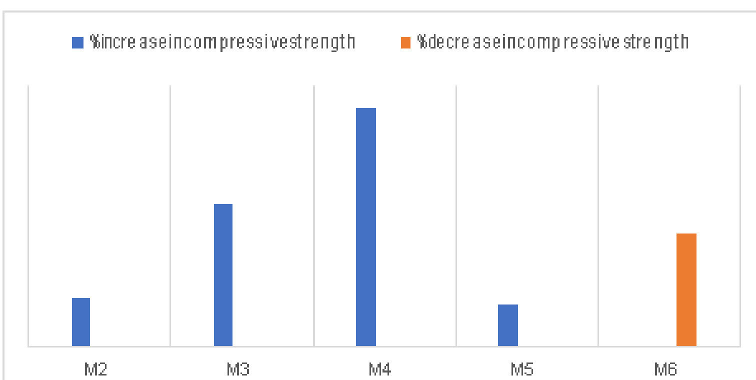
Fiber 4.3 shows the variation in tensile strength of cylindrical specimens with glass fibers and varying percentages of marble powder substituted with cement. The same trend is with the compressor, that is, with different percentages of fiberglass and marble powder (replacing cement) the strength increases up to a certain percentage and then decreases. The maximum tensile strength was achieved by replacing 0.5% glass fiber and 10% cement with marble powder. At 15% and 20% remove of cement with marble chips, a decrease in strength was observed compared to controlled concrete. As mentioned above, the reasons for the increase in strength are due to the fact that marble powder has some cemented properties, and the addition of fiberglass helps to increase the strength. Another reason is that the modulus of fineness of marble powder is relatively small, which helps to improve cohesion. Table 4.7 shows percentage increase and decrease in tensile strength compared to the controlled mixture.



Graph 3 Different types of break tensile strength of marble aggregate concrete Different percentages of marble chips

Table 11 Test Results on Compressive Strength

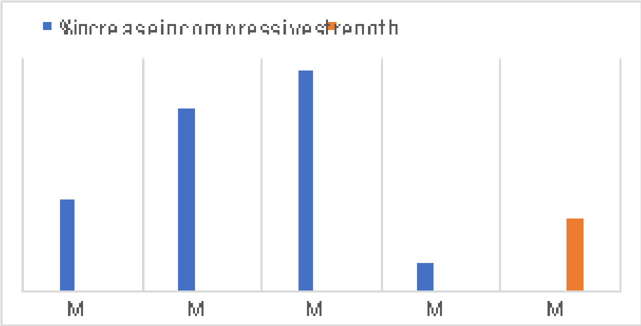
Mix NO	%INCREASE IN COMPRESSIVE STRENGTH	%DECREASE IN COMPRESSIVE STRENGTH
M2	**6.6**	
M3	**19.1**	
M4	**32**	
M5	**5.5**	
M6		**15.2**



Graph 4 Variations on compressive strength

Table 12 Test results on break tensile strength

Mix NO	%INCREASEIN COMPRESSIVE STRENGTH	%DECREASE IN COMPRESSIVE STRENGTH
M2	7	
M3	14.1	
M4	17	
M5	2.1	
M6		5.5



Graph 5 Variations on tensile strength

5. CONCLUSIONS

5.1 GENERAL

The present study was conducted to investigate the strength characteristics of fiberglass concrete and the different percentages of replacement of cement marble dust and quarry dust. complete replacement for river sand. Cement was replaced with 5%, 10%, 15% and 20%. The samples were then tested for 7 days and processed for 28 days. 9 samples of the reference mixture, ie prepared first by replacing the river sand with quarry dust, then 45 samples with 0.5% fiberglass and finer as a substitute for marble powder cement in different percentages with powder career. Prepared filling and experiments performed. ... When determining the compressive of strength and the tensile strength.

5.2 Conclusion

The following conclusions can be made based on the results of the experiments:

- Well powder concrete, as a complete substitute for river sand, shows compressive strength in 7 and 28 days compared to the nominal mixture.
- Tensile strength also shows increases in quarry concrete over 28 days compared to the marginal mixture.
- Concrete mix with 0.5% fiberglass and 10% marble as a cement substitute as an ideal percentage for maximum strength.
- Compressive and tensile strength increases with increasing percentage of marble chips.
- Improves compressive strength by 32% over 28 days compared to 10% for marble dust and 0.5% for fiberglass material compared to concrete when quarry dust is treated as a fine aggregate.
- The tension of marble powder in 10% and 0.5% fiberglass also increases to 17% in 28 days, while mine powder in combination with concrete forms fine aggregates.
- Replacement of cement marble with chips reduces by more than 10% both compressive strength and tensile strength.
- By increasing the percentage of marble shafts by 20%, the compressive strength decreases by about 15.2% and the tensile strength by 5.5% compared to a concrete mix containing quarry dust as a thin aggregate.
- Thus, it can be concluded that the strength characteristics have been improved by the use of fiberglass and the replacement of cement marble

powder.

- Marble powder, which is cheaper than cement, helps to reduce construction work and also improves the properties of concrete mixture.
- Compatibility of fiberglass with concrete or mortar makes it easy to use in construction, while AR fiberglass easily controls compression cracks.
- Marble powder can use in the future as alternative to cement or river sand.
- Both fiberglass and marble powder have proven beneficial in reducing environmental pollution, because fiberglass, being an environmentally friendly material, consumes less energy during production and controls the production of marble cement and the environment, protects against harmful effects of elimination. Marble mortar on land and in water.

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