An Experimental Study On Split Tensile Strength Of M30 Concrete Using Novel Seashell Powder And Egg Shell Powder As A Partial Replacement Of Fine Aggregate In Comparison With Conventional Concrete

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ABSTRACT: Aim: The study's goal is to compare the Split Tensile Strength of Novel Seashell and Egg Shell based Powder M30 concrete and conventional concrete. **Materials and Methods:** There are two categories taken into account. Concrete with egg and seashell powders is in group 1, while standard concrete is in group 2. There are 18 samples in each group, for a total of 36 sample sizes. The preparation and examination of the samples involved using a variety of tools and materials. **Result:** The independent sample T-test is carried out using SPSS software, version 21, was used. The mean Split Tensile Strength of conventional concrete sample is 3.59 N/mm^2, but the mean Split Tensile Strength of novel seashell and egg shell-based Powder M30 concrete is 4.87 N/mm^2. To assess the data, a T-test for independent samples is used. The mean values for the group statistical report were 3.5889 and 4.8411, and the independent t-test revealed a F value of 0.150. An independent sample t-test is performed on the two groups to see whether there is a significant difference, with g power set at 80% and p=0.000 (p0.05) as the cutoff. This indicates that there are statistical differences between the two groups considered in this study significantly from one another. **Conclusion:** The concrete with theNovel Seashell and Egg Shell based Powder M30 concrete had more Split Tensile Strength when compared to the conventional concrete.

Keywords: Novel Seashell Powder, Egg Shell Powder, Cement, Water, Fine Aggregate, Sustainable Infrastructure, Split Tensile Strength**,** M30 Grade, Conventional Concrete**.**

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1.INTRODUCTION

A framework and innovation are both necessary for a country or nation to advance. Concrete is regarded as the foundation of the structure. The use of concrete is widespread throughout the world. [1]Thus, concrete creation isn't harmless to the ecosystem, and concrete is the most costly material in the structure of cement and, in this manner, uneconomical. [2]Thus, it is important to track down elective materials to make the development business harmless to the ecosystem and supportable. Collection of waste material is expanding quickly in light of the fact that tremendous development in the populace is giving a source to it and this makes emergencies removal of waste. One arrangement of this emergency lies in reusing waste materials in line with some helpful items. [3-7]The substantial is around the world a significant development of different constructions from old opportunities to work today and remain supported in future. Population development, urbanization, globalization, and ecological contamination are a few elements that are answerable for social and monetary change of the general public. Natural contamination causes serious harm to the development of the earth and to tackle this issue, Green Concrete is becoming popular these days[8-10].

Many studies on novel seashell powder and egg shell powder concrete have been conducted over the past five years, with a total of roughly 168 publications on Google Scholar and 90 studies by the American Concrete Institute. Compressive behaviour of concrete containing egg shell powder is the most cited study. Mechanical qualities of high strength concrete in which fly ash and egg shell powder are used to partially replace cement. An experiment utilizing river sand in place of standard coarse aggregate in M40 grade concrete[11-14].

Thus, the development business is as of now searching for appropriate waste that will altogether diminish concrete use and eventually lessen development costs.) Squander from modern and rural fields, for example, copper, slag, quarry dust, rice husk debris, eggshell, Novel Seashell powder are a reason for reusing and ecological perils. Selecting Novel Seashell powder makes use for waste materials and Calcium-advanced eggshells are poultry squander with practically a similar synthetic organization as limestone. Egg Shell Powder is a decent gas pedal for concrete fasteners. The Egg Shell Powder and limestone are practically the same in synthetic nature. To this end, we can limit the utilization of concrete and garbage removal. Different scientists use Egg Shell Powder as a substitute for concrete. [15-19]Present exploration examined the new and solidified attributes of cement containing ESP. The utilization of Egg Shell Powder debris in substantial creation decreases the expense of unrefined substances and also adds to the development business[20,21]. Egg Shell Powder additionally adds to the development industry which tends to be lessened in development spending plans with high strength sturdiness of the substantial. In this manner, eggshells can be relevant to the decreased expense of development material and deliver another natural substance for advancement in the development business. To compare Egg Shell Powder concrete with conventional concrete using M30 grade concrete.

2.MATERIALS AND METHODS

The concrete lab in the department of civil engineering at the Saveetha School of Engineering served as the study's location. For the project's investigation, the material's Split Tensile Strength was taken into account. The 100 mm x 200 mm cylindrical mould size was used. To determine the strength of the specimens that had been cured, a universal testing device of the load gauge was used, and its standard mean is split tensile strength. The experiments were split into two groups. One set of the concrete specimens was made using Conventional Concrete of M30 grade in accordance with IS regulations, while the other groups were made using 15% Novel Seashell Powder and 25% Egg Shell Powder combined with M30 grade concrete, cement, aggregate, and water. The G power program has computed the sample size, which indicates that each group contains 18 samples and that a total of 36 tests may be run. The SPSS program (version 21) may be used for the statistical analysis comparative research. The two groups' respective means are 31.332 and 39.780[22].

Group-1 mixes and batches concrete for the sample specimen. Group-1 batches and mixes concrete for the sample specimen. This concrete was poured into the molds in three equal-height layers, with each layer tamped 25 times. During this time, the vibration technique is also employed. Similarly, the same procedures were followed for Group 2, with the exception that Egg Shell Powder was added to the concrete in proportion to the volume of cement. The Split Tensile Strength of eighteen group-1, traditional self-healing specimens, was determined. Similarly, the Split Tensile Strength of 18 concrete examples from Group 2 (Novel Seashell Powder and Egg Shell Powder) was determined[23].

3.Statical Analysis:

The analysis was completed using the SPSS (version 21) programme, and water-cement ratio of curing, and sample T-test were independent variables that were found individually to ascertain the study's analytical differences variable. The significance of the SPSS analysis is 0.000 ($p<0.05$). This demonstrates that the two groups taken into consideration in this study differ statistically significantly. With this technique, the standard deviation and standard error of the mean were also computed for the split tensile strength. The mean values for the group statistical report were 3.5889 and 4.8411, while the F value for the spss analysis report is 0.150[24].

4.RESULTS

In comparison to conventional concrete, which had a mean split tensile strength of 3.59 N/mm^2, novel seashell and egg shell powder concrete had 4.84 N/mm^2. The split tensile strength of conventional concrete had a standard deviation of 3.5889 whereas it was 4.8411 for novel seashell and egg shell powder concrete. While the chart illustrates the significance of split tensile strength for the split tensile strength values of 18 samples with the inclusion of novel seashell powder and egg shell powder in table 2, table 1 displays the split tensile strength values of 18 samples without conventional concrete.

Table 1: Result of Split Tensile Strength of the conventional concrete (M30 grade)

 https://doi.org/10.1051/e3sconf/202449102008

S. No	Mix Type	Split Tensile Strength (N/mm^2)	Average Split Tensile Strength (N/mm^2)
1	M30 Grade Conventional Concrete	3.5	3.59
2		3.8	
3		3.6	
4		3.4	
5		2.5	
6		3.6	
7		2.8	
8		3.4	
9		4.5	
10		4.4	
11		3.6	
12		3.8	
13		2.8	
14		3.2	
15		4.4	
16		3.4	
17		4.5	
18		3.4	

Table 2: Result of Split Tensile Strength of Novel Sea Shell and Egg Shell based Powder M30 Concrete.

S. No	Mix Type	Split Tensile Strength (N/mm^2)	Average Split Tensile Strength (N/mm^2)
1	Novel Sea Shell and Egg Shell based Powder M30 Concrete	5.14	4.84
2		5	
3		4.5	
4		5.4	
5		4.4	
6		3.9	
7		4.8	
8		4.6	
9		4.8	
10		6.4	
11		4.8	
12		4.1	
13		4.8	
14		4.4	
15		4.7	
16		5.4	
17		5.1	
18		4.9	

Table 3 displays the group statistical information for conventional and egg shell powder-made concrete.

Table 3: Group Statistical analysis of comparison Conventional concrete and Novel Seashell powder Egg Shell Powder concrete.

	Groups	N	Mean	Std. Deviation	Std. error Mean
Values	Conventional concrete	18	3.5889	0.58399	0.13765
	Novel Seashell powder and Egg Shell Powder concrete	18	4.8411	0.55652	0.13117

Table 4: Since the intensity of the significant difference between the two groups' results in an independent sample T-test P=0.000 is less than (p<0.05), an independent sample T-test is conducted for each group. This indicates that the two groups taken into consideration in this study differ statistically significantly. Show in table 4.

Levene's Test for Equality of Variances			T-test for Equality of Means						
			t	df	Sig (2-tailed)	Mean Difference	Std.Error Difference	95% Confidence Interval of the Difference	
	F	Sig						Lower	Upper
Equal Variance assumed	0.150	0.701	-6.586	34	0.000	-1.25222	0.19014	-1.63863	-0.86581
Equal Variance not assumed	-	-	-6.586	33.921	0.000	-1.25222	0.19014	-1.63867	-0.86578

The significance of the SPSS analysis is 0.000 (p 0.05). This demonstrates that the two groups taken into account in this study differ statistically significantly from one another. The effective prediction is accompanied by the mean accuracy values for the two groups of concrete made using novel seashell powder, egg shell powder, and traditional concrete, with a p-value of 0.05 and an error bar of 95%. The error bars show mean accuracy detection (+/-1SD) on them.

Show in fig 1,2,3,4,5,6,7,8.

Figure 1: Collection of Novel Sea Shells

Figure 2: Novel Sea shell powder

Figure 3: Collection of Novel Egg Shells

Figure 4: Novel Egg shell powder

Figure 5: Mixing of Concrete

Figure 6: Testing of Cylinder Specimen

Figure 7: Casting of Cylinder Specimen

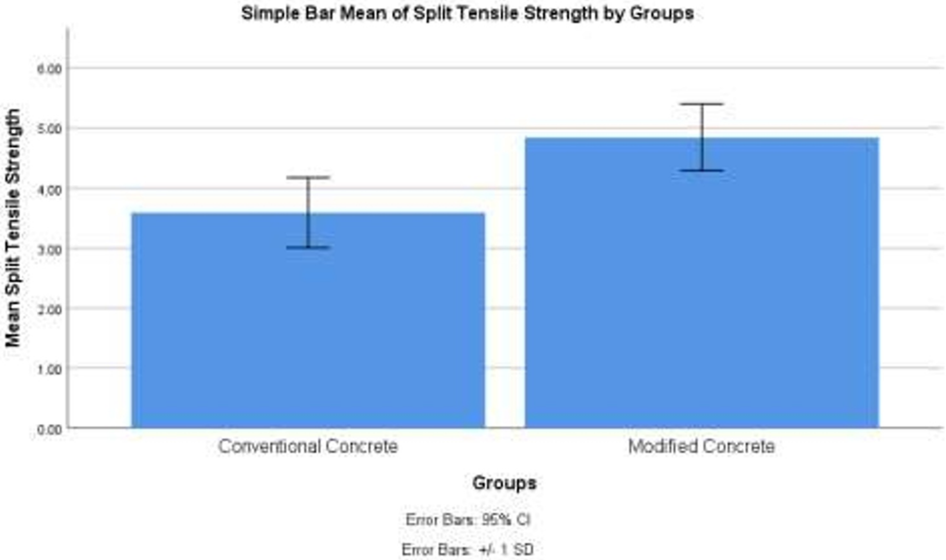

Figure 8: Bar Chart Bar Chart shows the X: axis group statistics of conventional concrete and modified concrete. and the y axis is about the mean Split Tensile Strength of m30 grade concrete.and the SD +/-1 and the confidence interval is about 95%.

5.DISCUSSION

The accompanying perceptions were produced using the test directed. (Ruslan et al. 2022)The substitution by Novel Seashell powder and Egg Shell Powder concrete's Split Tensile Strength increased at all times of relieving as compared to the Control Concrete's Split Tensile Strength, and the Control Concrete's Split Tensile Strength increased by 15%

of Novel Seashell powder and 25% of Egg Shell Powder levels at halfway.(Ganesan and Thanasekaran 2011).

Analyzing the performance of an experimental self-compacting concrete mix by comparing it to conventional concrete (M25). (Latha, Partheeban, and Ganesan 2017; Latha, Ganesan, and MadhanKumar 2022; Ramachandran and Kumarasamy 2013). An experimental analysis of fly ash's impact on egg shell powder concrete. Both give a good cementitious property and reach the physical properties of cement(Khan 2017).

Review of the chicken egg shell powder on strength properties. (M.s., Sugirtha, and Sargunan 2019) Cement can benefit from using Egg Shell Powder waste instead of ordinary lime or concrete since it limits the amount of concrete used, protects regular lime, and makes use of waste. For concrete fasteners, egg shell powder serves as a respectable gas pedal. (Kanna et al. 2022)The Egg Shell Powder and limestone are practically the same in synthetic nature. To this end, we can limit the utilization of concrete and garbage removal. (Ashwathi 2022)Different scientists use Egg Shell Powder as a substitute for concrete. Present exploration examined the new and solidified attributes of cement containing ESP.

6.CONCLUSION

The Split tensile strength of novel seashell and egg shell based powder M30 grade concrete increased by 13.48% as compared to conventional concrete, with a mean comparative analysis of 1.25 N/mm^2. As a result, concrete made with eggshell and unique seashell powder can produce good results in terms of Split tensile strength.

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