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## THE IMPACT OF COVID-19 ON THE PHARMACEUTICAL SECTOR'S STOCK MARKET

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### Abstract

Covid-19 is a Global pandemic that affected the world badly. While rising number of cases led the governments to make a lockdown decision. To break the chain of spreading of Covid-19 the government has decided to implement the lockdown. This decision taken by the government has affected all sectors in the world. Also, all industries suffered because of the COVID-19 lockdown. The study's main objective is to measure the COVID-19 impact on the pharma sector's performance in the stock market. The impact of COVID-19 on pharmaceutical companies is measured with the application of the Z-test, ANOVA. The tentative result of the research is to measure the pre-COVID times data with post-COVID pharma sector stock performance. This study will give a clear picture of whether Covid-19 impacted the stock market or not.

Keywords: Covid-19, Coronavirus, Pharmaceutical Industry, Pharmaceutical market, Lockdown, RSI, Moving average

### Introduction

The novel coronavirus disease was found in December 2019 in Wuhan, China. The COVID-19 disease has spread all over the world rapidly. For the Covid-19 Disease, there was no Vaccination and there is no specialized therapist for this disease. The COVID-19 disease disrupted the economic activities of the world. As the number of infected cases was rising this affected the day-to-day life of the people. World Health Organization (WHO) announced it as a Global pandemic on 11 March 2020. The Government of India decided and announced the lockdown in India on the 24<sup>th</sup> of March 2020. This lockdown affected the life cycle of the people along with this was also affected the economy of the country. During the situation, the pharmaceutical sector stood with the government and tried to meet all the necessities. On the other side in the stock market there was a massive drop of Sensex. In the Bombay stock exchange about 13.2% drop in the Sensex indices this was there second Highest drop after the Harshad Mehta's Scam 1991. During the same time Nifty also dropped about 29%. This pandemic has taken an extensive toll on different Industries. But in 2020 the pharmaceutical sector performed well and the result of the sector also on the upward trending in the stock market. India is 3rd largest pharmacy manufacture in the world. Indian pharmaceutical sector worth about US\$40 billion value and one of the world's largest generic medicines providers globally. About 20% of the pharmaceuticals manufactured in India is exported to overseas. India has more skilled workforce. Indian pharmaceutical sector export pharmacy to the more than 200 countries and territories in 2021. Pharmaceutical sector has 9.4% year-on-year growth. The Indian pharmaceutical sector has its own brand for the generic medicines. India is having the two biggest stock markets that is Bombay Stock Exchange (BSE) and National Stock Exchange (NSE). On March 23rd 2020 the stock market was blowdown because of lockdown announcement in the country. Sensex was downfall about 13.2% it is one of the massive drops after 1991 Harshad Mehta's Scam. It is the second single day drop in the stock market history. Nifty also dropdown about 29% because of the Covid-19. In the factories the production is also minimized, and supply chain is also affected because of the Covid-19. Supply chain was disrupted because of the Covid-19 protocols in India. In India we have seen lot of changes. Many people migrated from urban place to their natives during the time when they have announced lockdown in India. In the consumption pattern of the consumers in India was also impacted because of the Covid-19. Pharmaceutical sectors growth was in slow pace but eventually pharma sector started to grown rapidly. Other sectors impacted negatively but only pharmaceutical sector was in growth phase. Pharmaceuticals performed well amid of Covid-19. Nifty Pharma sector showed a positive return that is about 19% in the year 2020. Also, during the 2020 only Nifty pharma was in the green and other sectors indices were in red color in the graph. That shows the return and the performances of all the sectors in the stock market. One more important observation is that the pharmaceutical sectors hit the 52 weeks high during the Covid-19 times. During the pre-Covid times the Nifty pharma's movement was moving both upward and downward trends. By the hit of Covid-19 the pharmaceutical sector stock were growing only in upward trends. Covid-19 fear led the investors to focus more on the healthcare and pharmaceutical sector. Because to combat with the Covid-19 only is pharma and healthcare sector that is the reason for the investors to focus on these sectors. Some of the pharmaceutical manufacturers collaborated with foreign companies and the vaccination trail by the companies in the Country also affected the pharmaceutical sector stocks to gain positively in the Stock market.

## Review of literature

**Aravind. M and Manojkrishnan C. G (2020):** This article was published on “International Journal of research in pharmaceutical Science” this is a study done on the stock market and specially on pharmaceutical sectors performance during the outbreak of Covid-19 in India. Here they have taken 10 leading company stocks that are listed in NSE. The analysis is done on the stock market performance during the time and reason for the reversal performance of the stocks during the lockdown period. The information contains from the 10 leading companies have considered and data set from the September 2019 - February 2020 data is been considered here for the study. This study encourages the research and development activity in the industry to improve the profitability of the leading pharmaceutical companies such as Sun pharmaceutical industries Ltd., Glenmark and Cipla etc. For the research they have collected only 5 months data.

**Shivam Mittal and Dipasha Sharma (2020):** This article clearly does the study on the pre covid performance with the post covid time performance. The outbreak of Covid-19 affected literally everything in world. But in the stock market every sector is affected because of the Covid-19 outbreak. Only healthcare and pharmaceutical sector stocks were affected differently than other sectors. In the study they have taken the data from May 2019-April 2020 about the 233 days data is collected. Here the analysis is done based on the sector based. Intention of the study is to compare the one sectors with the other sectors that is the reason behind this study. Here for their study, they have considered only the BSE Health care indices only no other company data is used.

**Vishesh Phogat (2020):** This is a comprehensive study done by him. Here data is not used in this paper. This is research paper consist of overall information about the state national pharmaceutical policy. In the study they have included the impact of lock down on the different sector such as the impact on Indian pharma sector, Impact on the stock market, and on the sectors as well. This paper is having the theoretical aspects more than the data representation. This paper provides only the assumed conclusion. There is no statistical data analysis to prove any hypothesis here.

**Mohammad Noor ALAM, Md. Shabbir ALAM, Kavita CHAVALI (2020):** It is a paper with good amount of information. It covers from where all the information from where this Covid-19 started and all the challenges faced by the pharmaceutical and medical professionals. Cons to the country like India have been explained clearly by them with some world bank data. Here they have given clear impacts of the covid-19 on the people of the country and other causes have explained well. The writers have covered the stock market response to the pandemic and lockdown is also expressed here. In this study they have done the pre-covid time stock market test with the post covid time performance and have done the t -test to do hypotheses test also. They have taken all the data from the different sectors. This paper is more generic and kept specifically to one sector.

**Dr T.C. Thomas, Dr G. Shankararamanan, Dr S. Suresh (2020):** This research paper is completely dedicated to the nifty and its performance during the pandemic for that purpose. After the announcement of the Lockdown in India for about the 21 days to avoid the spreading of the covid-19. There was a massive drop in the Nifty that is about 31%. Nifty also recorded 52 weeks lowest in the stock market performance. The outbreak of the Covid-19 has hit the 45 companies among the 50 companies in the Nifty. That affected the companies to reach the multiyear lowest of these companies. The data is collected with both pre-covid times and post-covid times and computed with the different statistical analysis. The paper is also given does some of the hypothesis test in order to analyze the performance of the stock market pre covid times and post covid times.

**Sidharth Sachdeva (2020):** This paper is talks about the Covid-19 virus spread over 180 countries and adverse effects of the coronavirus on the country's economic activity. Covid-19 effects on the social and economic activity is also represented here. When the world health organization announced the Covid-19 as the global pandemic the investors in India is not paid adequate seriousness to it. After the lockdown there are some effects in the stock market made the stock market to record the historical low in the market. The whole lockdown and investors perspectives. There are some of the ambiguities in the investors mindset that is also here they have presented. For the analysis part they have considered a data for about 10 years period and calculated the Index return for the year is calculated here. They have compared the Covid-19 situation with the Spanish flu that was in the year 1918. Also, they included some of the difference to that situation and current situation in the paper. Effect of the covid-19 on the supply chain management, tourism, hospitality and entertainment is presented. This paper presents the adverse effect of covid-19 on different sector as well on the GDP of the country. This paper presents information of all the sector and it is not done a specific study on one particular sector.

**S Ravi (2020) Impact of COVID-19 on the Indian Stock Markets (business world):** This is one of the best papers which provide more data. Here in every moment of the market is studies and presented with the data than in words. They have studied the markets such as NSE and BSE. They give clear picture about the performance of the NSE and BSE in the previous year i.e., on 2019. The fresh year and performance of the fresh year is also recorded in the paper till the lockdown time. They have clearly shown the market behavior as the numbers of cases rise. After the announcement of the lockdown everything is presented here. Here comparison with the 2008 financial crisis though there are difference in the whole scenario. Also, about the innovations took during the pandemic in the Technology firms have been presented in the period. But in the study data after the Covid-19 is not available that is the gap found in the paper.

**M Praveen Kumar, N V Manoj Kumara (2021) (Market capitalization pre and post covid-19 analysis):** This research paper focuses on impact of Covid-19 on Stock market performance and market capitalization. Initially the comparison study on the market capitalization is done with pre Covid-19 and on post Covid-19 time period. Data for the study purpose they have done the study from January to April in 2020. The Covid-19 Crisis drops the market crash to one of the lowest points. Importance of the market capitalization of the company is presented in an understandable manner. It takes initiative in terms of educating on the market capitalization. Comparison study between the January closing indexes with the April closing Indexes is done here. It presents the facts about the Nifty 50 loss about 38% on that. In terms of overall market capitalization fell by 27.31%. Sector wise travel, transportation, entertainment industry, oil and gas were affected. 40% of these sectors stocks drop down during the lockdown in India.

**Navneet Sharma, Dr Trishu Sharma (2021) (Impact of positive news on stock market prices of Pharmaceutical Sector in NSE During Covid-19):** Research papers provide more information as such this paper completely focus on the Nifty50 and Pharmaceutical sectors. Covid-19 Impacted the Global Economy and Stock market tremendously. Indian Stock markets BSE and NSE have faced the deep steep during the global pandemic times. But the underperforming stock pharmaceutical sector stocks substantially increased globally because of the news on 11<sup>th</sup> march. This research paper studies clearly on the impact of the Covid-19 outbreak on the news on to the performance of the pharmaceutical sector. Data for the performance analysis purpose is collected comparison of the stocks pre-Covid times and post-Covid times for that purpose they have collected the data for 6 months in that 3

months pre Covid-19 times and 3 months for post Covid-19 times. This study is inclusive of Nifty50 performance along with pharmaceutical sector performance during the Covid-19 times. They have done the comparison study between Nifty50 with pharmaceutical sector. This paper has the information about the factors for stock prices movement in the market in a brief manner. After the announcement of the lockdown investors shown the more interest towards the pharmaceutical sector. Also, in the market demand of the for the pharmaceutical sector stocks is increased during the time. Because of this faith of the investor made the pharmaceutical sector to perform well and be the lucrative business during the global crisis.

**The performance of the Indian stock market during COVID-19 by Rashmi Chaudhary, Priti Bakhshi, Hemendra Gupta:** This paper mainly studies on the BSE 500 and BSE Sensex. Along with the BSE500 and Sensex they have the analysis based on the sectoral wise. The Covid-19 crisis that affected the global economy. This paper is also included the reasons for the failure to maintain the spread by the government. For the analysis purpose they have used the stock market data since January 2019 to May 2020. To present data in a scientifically proven way they have used the many statistical calculations to present it very clear manner. They have used the statistical calculations such as return calculation, standard deviation, skewness, kurtosis, correlation and regression analysis is done on the data collected is used. It concludes that they have done some analysis on pre and post Covid-19 times data as per the results the mean of the return is lower and only healthcare sectors stocks were performing sustainably positive way amid of Covid-19.

**Farhan Ahmed, Aamir Aijaz Syed, Muhammad Abdul Kamal, Maria de Nieves Lopez-Garcia, Swathi Gupta.:** This Paper study the impact of Covid-19 on the Indian stock market and commodity market. Lockdown and its impact on the market and extension of lockdown and its impact on the stock market. Comparison study of the market with pre covid-19 times with the covid-19 times performance. The major study on the stock for is descriptive analysis and t-test to measure the difference in the performance of the stock market in pre-covid and post-covid times. This is not only studying the Indian market but they have also studied the south Asian market. To measure the variance in the return ANOVA test is conducted. But the research is limited to market index but here they haven't focused on one particular sector. This covers the vast data size but the study is not on specific to any of the outcome.

### Objectives of the Study

Covid-19 outbreak news affected the financial market of the world horribly. But under the situation one sector was the shining star of the dark night was pharma sector. Only hope was left on the healthcare and pharma sector for everyone to sustain. Also, in the stock market investor were in favour to this sector. This led me to take this topic to make an attempt to understand.

- To find out the effect of the pandemic on pharmaceutical sector in the stock market. For the large cap pharmaceutical companies because they are not much risky investment for investor.
- Impact of lockdown on the pharmaceutical sector stock. Because there was an more demand for the Generic Drug.
- To measure the change in the performance of the pharmaceutical sector stocks after the pandemic with pre pandemic performance.
- Conducting a technical analysis to find the reasons for pharmaceutical sector to sustain during the time bad times of stock market.
- To measure the influence of pharmaceutical sector stock price during the pandemic situation.
- To measure the pharmaceutical sector stocks performance with the other sector.

The above given objectives are the primary objectives to conduct the research on pharmaceutical sectors stock. There are many other sector stocks also were there in the market. But in this is a crisis which we can fight by the support of pharmaceutical and health care. This let me to conduct research on this topic.

## Research Methodology

Nonprobabilistic sampling Convenient method of data collection is adopted for the study. Data for 11 pharma companies have been collected.

### Data source:

Secondary data is used for the study and the data is being collected from the NSE website.

### Sample size of the data:

To conduct the research data for 11 companies have been collected. the closing value of the stock for 247 trading days is collected and then that data is divided into two portions. Early 123 days presented as pre-covid data and another set is presented as post-covid-19 data.

### Limitations of the Study

Every research has its objectives to fulfill in the same way this project intends to measure whether the global pandemic hit affected the pharmaceutical sector stocks or not. But this study is completely focused on the effect of the covid-19.

- This is more focused on the performance of the stocks of the pharmaceutical sector only.
- This study doesn't provide any innovative way to handle the situation and to gain.
- This study doesn't study the news and its effect on the pharma sector stocks
- The study only focused on the quantitative study rather than the qualitative part.
- While in the stock analysis, the preference for the fundamentals is not there.

The above given are some of the Limitations of the study. These are the observed limitations.

### Analysis and Interpretation

#### Sun pharmaceutical industries Ltd.



Fig.1

Fig.2

**Bollinger band**

During March and April 2020 there we can see a more variance in the performance of the stock from.

**Moving Average**

By the end of March and April, there was an upward moment of the stock in the market and stock traded over the moving average in



Fig.3

**Relative strength index**

From 20th February 2020 to 2nd March 2020 the stock was oversold in the market. After the Covid-19 Lockdown the stock of the Sun pharma is overbought only for two days.

**Dr Reddy's Laboratories Ltd**



**Bollinger band**

Fig.4

Fig.5

According to Bollinger band the stock was performed undervalued during the 12th March to 19th March 2020. From 3rd April to 7th May there was a massive fluctuation shown in the Bollinger band

**Moving average**

From 24th Mar 2020 to 28th April 2020 was in upward trend. The stocks during the time valued over the Moving average



Fig.6

**Relative strength index**

In March stock was oversold 3 days in that month. After the pandemic announcement the stock was overbought in the market from 7th April 2020 to 27th April 2020.

**Aurobindo Pharma Ltd**



Fig.7



Fig.8

**Bollinger band**

From 6th March to 8th April there was a volatility. After that band was squeezed on 8th April 2020.

**Moving Average**

From 26th March 2020 to 26th June the stock value is traded above the Moving average. For the period the stock was in upward trend that is in positive way.



Fig.9

**Relative strength index**

From 20th March 2020 to 23rd March 2020 the stock was oversold. This also a symbol of Selling in the market. 20th April 2020 to 27th April 2020 the stock was overbought as per the RSI.

**Cipla**



Fig.10 Fig.11

**Bollinger band**

After 20th March 2020 the bullish trend can be observed from the chart. Volatility was at its peak at times between 3rd March to 8th May 2020.

**Moving Average**

After the 26th Mar 2020 the stock performance is changed from the downward trending to upward trending in the market. The stock was also performed above the moving average trend line. From 26th Mar 2020 to 24th April 2020 the stock was in positive trending line



Fig.12

**Relative Strength Index**

After the announcement of the Pandemic in April from 8th April 2020 to 29th April 2020 the stock was oversold in the market. **Divis Laboratories Ltd.**



Fig.13 Fig.14

**Bollinger band**

On 11th March there was some Squeeze in the band. On 8th April 2020 there was a squeeze in the performance these Squeeze are the indicator for the future volatility

**Moving average**

From 9th Mar 2020 to 3rd of April 2020 the stock was in downward trend and the value of stock is also performed under the moving average trend line. After the 7th April 2020 the stock moment was in positively and upward trending.



Fig.15

**Relative strength index**

The 1st overbought was from 28th January 2020 to 3rd February 2020. After that from 5th February 2020 to 24th February 2020. After that from 30th July 2020 to 28th August 2020 the stock was overbought or the moment for the buying indicator for the Investor was indicated in the market.

**Lupin Ltd.**



Fig.16



Fig.17

**Bollinger band**

Stock volatility was less till 7th April 2020 after that there was a massive volatility in the stock performance till 11th May. After that the stock was in steadily bullish in trend.

**Moving average**

We can see the performance of the stock between the 26th Dec 2019 to 1st of April the stock was in downtrend along with that the stock value traded in the market was below the moving average. From 3rd of April 2020 to 30th April 2020 the stock was performing well.



Fig.18

**Relative Strength Index**

From 25th March 2020 to 27th March 2020 the oversold the stock in the market. After the pandemic the stock was Overbought from 8th April 2020 to 20th April 2020 the stock was over bought in the market.

**Biocon**



Fig.19



Fig.20

**Bollinger band**

On 3rd April there was some squeeze in the stock performance. From April 3rd to 8th May 2020 there was huge volatility in the performance and the stocks performed between positive deviation and mean band that represents the stock is in bull run.

**Moving average**

After from the 26th March 2020 to 24th April 2020 the stock was in upward trending in the market and the stock was also traded above the Moving Average.



Fig.21

**Relative strength index**

After the pandemic hit the stock was overbought two times in the market. One is from 16<sup>th</sup> April 2020 to 22<sup>nd</sup> April 2020. This stock was never crossed the 30% band in the RSI indicator this was the speciality of the stock in market performance.

**Cadila Healthcare**



Fig.22



Fig.23

**Bollinger band**

This stock was had the less volatility in the market till 3rd of April. In the performance of stock there was a massive volatility after the 3rd of April to 9th of May and stocks were overbought at this period.

**Moving average**

From 25th Feb 2020 to 1st of April 2020 there was lot of fluctuation in the performance of the stock in the market. From 1st of April 2020 to 22nd of April 2020 the stock was traded over the Moving average and along with that the stock performance was in a positive way.



Fig.24

**Relative strength index**

There was no overbought or oversold moment for the stock market on a pre-covid times. First time the stock was overbought from 7th April 2020 to 13th April 2020. Second time it was between 3rd August 2020 to 4th August 2020.

**Piramal Enterpri**



Fig.25



Fig.26

**Bollinger band**

There was a massive volatility in the stock performance between the 6th of March 2020 and to 13th of April 2020. From 29th April to 29th May there was less volatility in the performance of the performance.

**Moving average**

From 25th February 2020 to 26th March 2020 there was a massive downfall in the stock performance and the value of the stock was also traded under the moving average line in the market. After the 26th of March 2020, the stock performance was in a slightly positive way and the movement of the moving average was in an upward trending.



Fig.27



**Relative strength Index**

The stock performance was oversold in the market. From 11th March 2020 to 25th March 2020 the stock was oversold in the market. In 1st of June 2020 to 2nd June 2020 the sold over bought in the market.

**Torrent Pharma**



Fig.28



Fig.29

**Bollinger band**

From 30th Sept to 21st Nov 2019 there was a quite volatility in the stock performance in the market. From the 06th March to 7th May there was a massive volatility in the market was been observed.

**Moving average**

This insists the trader not to invest on the stock. From 30th March 2020 to 17th April 2020 the stock was performed over the moving average line. From 30th July 2020 to 12th August 2020 the stock again traded over the Moving average line.

**Relative strength index**



Fig.30

From 7th April 2020 to 9th April 2020 the stock was overbought or giving signal to buy to the investor in the market. Last over bought signal for the stock for that period was from the 31st July 2020 to 10th August 2020 the stock was overbought from the stock market.

**GlaxoSmithKline pharmaceutical Ltd.**



Fig.31



Fig.32

**Bollinger band**

From 3rd Feb 2020 to 31st March 2020 the stock was performed below the mean band and negative standard deviation band. Few times the stock was oversold during the time. This stock was performing in a more volatility than comparing with the other stocks as well.

**Moving average**

From 28th February 2020 to 30th March 2020 the stock was traded under the moving average. But after the 30th March 2020 the stock raised its performance till 22ed April 2020. The stock is traded over the moving average. After that there was slightly fluctuation was there in the market.



Fig.33

**Relative strength index**

The Stock was oversold from 3rd February 2020 to 17th February 2020 and from 11th March 2020 to 12th March 2020 the stock was oversold in the market. After the announcement of the pandemic this stock not crossed the 70% and 30% band. Its performance between the 70% and 30% band only.

Average of the large cap pharmaceutical company's performance on pre-covid time stock market performance and post covid-19 times performance is measured.

Large Cap Pharma companies	Pre covid-19	Post Covid-19	Change in performance	% Change in performance of the stock
Sun pharmaceutical industries Ltd.	423.753	463.251	39.498	9.320947624
Dr Reddys Laboratories Ltd.	2890.150	3855.128	964.978	33.38851672
Aurobindo Pharma Ltd	498.653	683.714	185.060	37.11203846
Cipla	457.165	604.122	146.957	32.14536587
Divis Laboratories Ltd.	1813.496	2387.176	573.680	31.63393456
Lupin Ltd.	740.322	834.873	94.551	12.77158793
Biocon	269.592	361.154	91.562	33.96299305
Cadila healthcare	252.872	339.616	86.745	34.30392626
Piramal Enterprises	1648.879	1142.299	-506.580	-30.72268737
Torrent Pharma	1844.328	2404.467	560.138	30.37086439
GlaxoSmithKline	1518.817	1407.613	-111.205	-7.321789525

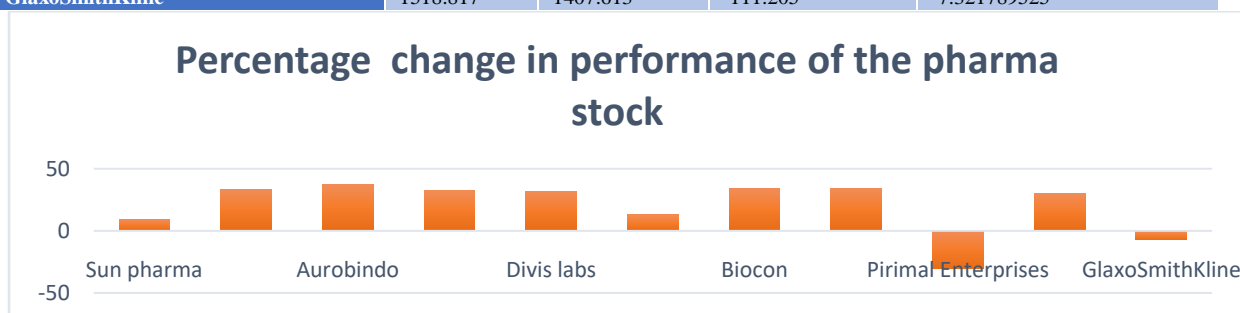


Fig.34

**Interpretation:**

In the above table it consists of 11 large cap pharma companies. The performance of these company's stock is been used to determine the change in the performance. By observation from the table, it depicts that Cadila healthcare (Zybus Cadila) company performance is increased by 34.31% and Aurobindo Pharma Ltd company stocks value is increased by 37.12% these are the two companies. Which is having a better performance after the pandemic hit. And Piramal Enterprises and GlaxoSmithKline company stock performed in a negative way. Among these 11 large cap companies only 2 companies performed negatively.

**Study of different sector performance prior to the Covid-19 and post Covid-19 times**

Sector	Pre-covid	Post- Covid	Difference in performance	% Change in difference
Automobile	7874.947	6386.034	-1488.913	-18.90696056
Bank	30374.835	21139.348	-9235.487	-30.40505948
Financial Services	13800.958	10359.821	-3441.136	-24.93404048
FMCG	30635.966	28991.125	-1644.841	-5.368987129
IT and ITES	15684.827	14810.130	-874.697	-5.57670994
Media	1814.347	1275.649	-538.698	-29.69100857
Metal	2561.727	1955.645	-606.082	-23.65911343
Pharma	7967.212	9530.270	1563.058	19.61863034
PSU Bank	2394.528	1379.536	-1014.992	-42.38798448
Realty	284.719	198.449	-86.270	-30.30018004

Table No.2

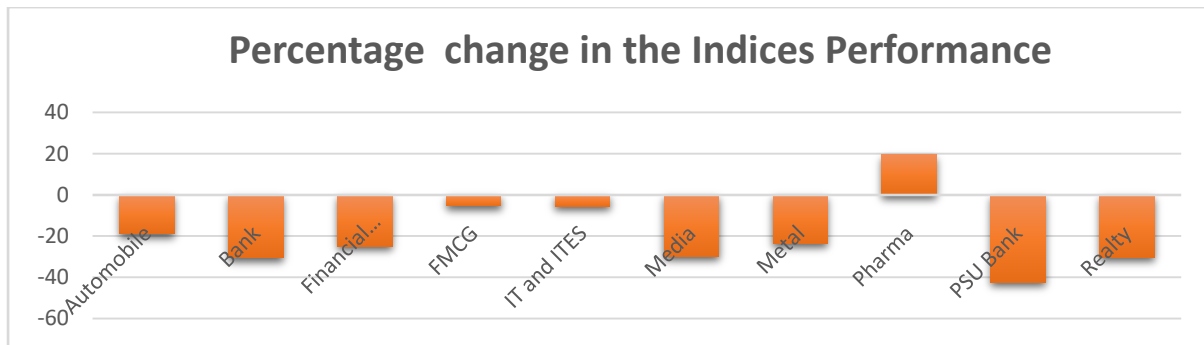


Fig.35

**Interpretation:**

In the above table we can see the difference in the performance of the different sector index in the stock market. To determine the change in the performance. Post covid times performance and pre covid time performance data is used. As we can see from the above table that depicts that only the Pharma sector indices is in the positive report. Apart from the Pharma all other sectors such as Automobile, Bank, Financial Services, FMCG, IT and ITES, Media, Metal, PSU Bank and Realty sector is in negative difference. The above table communicate that only one sector performance is affected in positively and remaining sector performance is affected negatively.

Z -test to measures the significance difference in the performance between pre-covid and post-covid

At 5% significance level

H0:  $H < H_0$ : There is no significance difference in the performance of the company stock

H1:  $H > H_0$ : There is a significance difference in the performance of the company stock

Company name	Event pair	Mean	Variance	Z value	two tail
Sun pharmaceutical industries Ltd.	Pre- covid	423.753	282.919	-1.68	0.0921
	Post- covid	463.251	3016.092		
Dr Reddys Laboratories Ltd.	Pre- covid	2890.150	30263.802	-4.33	0.0000
	Post- covid	3855.128	268027.500		
Aurobindo Pharma Ltd	Pre- covid	498.653	3949.938	-2.43	0.0153
	Post- covid	683.714	30976.750		
Cipla	Pre- covid	457.165	194.397	-3.11	0.0019
	Post- covid	604.122	13189.655		
Divis Laboratories Ltd.	Pre- covid	1813.496	27506.050	-3.58	0.0003
	Post- covid	2387.176	126791.820		
Lupin Ltd.	Pre- covid	740.322	713.000	-1.85	0.0638
	Post- covid	834.873	14903.031		
Biocon	Pre- covid	269.592	859.998	-3.95	0.0001
	Post- covid	361.154	2365.745		
Cadila healthcare	Pre- covid	252.872	171.577	-4.47	0.0000
	Post- covid	339.616	2091.744		
Piramal Enterprises	Pre- covid	1648.879	20347.270	4.35	1.0000
	Post- covid	1142.299	61290.551		
Torrent Pharma	Pre- covid	1844.328	22364.630	-4.46	0.0000
	Post- covid	2404.467	72220.833		
GlaxoSmithKline	Pre- covid	18517.250	18517.250	1.64	0.1008
	Post- covid	9035.884	9035.884		

Table No.3

**Sun pharmaceutical industries Ltd.**

For the Sun pharmaceutical industries Ltd stock performance is not having much impact as per the Z test and it represents that the Calculated Z value is -1.68 which is greater than the Tabulated Z value that is -1.96. So here the Null hypotheses is accepted. It presents that there is no significance difference in the performance of the Sun pharmaceutical Industries Ltd stocks in the stock market.

**Lupin Ltd**

For the Lupin Ltd stock performance is not having much impact as per the Z test and it represents that the Calculated Z value is -1.85 which is greater than the Tabulated Z value that is -1.96. So here the Null hypotheses is accepted. It presents that there is no significance difference in the performance of the Lupin Ltd stocks in the stock market.

**GlaxoSmithKline**

For the GlaxoSmithKline stock performance is not having much impact as per the Z test and it represents that the Calculated Z value is 1.64 which is less than the Tabulated Z value that is 1.96. So here the Null hypotheses is accepted. It presents that there is no significance difference in the performance of the GlaxoSmithKline stocks in the stock market.

From the Z-test learning is among the 11 Large Cap Pharma Company's stock. The 3 company's stock is having no significance difference in its performance. Other than that, there are 8 companies and its performance is having a significance difference.

**Z -test to measures the significance difference in the performance between pre-covid and post-covid**

Company name	Event pair	Mean	Variance	Z value	two tail
Nifty Auto	Pre- covid	7874.947	118060.177	3.6208	0.0003
	Post- covid	6386.034	896486.935		
Nifty Bank	Pre- covid	30374.835	2185522.000	10.1842	0.0000
	Post- covid	21139.348	2748714.000		
Nifty Financial services	Pre- covid	13800.958	590139.700	7.6938	0.0000
	Post- covid	10359.821	610103.500		
Nifty FMCG	Pre- covid	30635.966	499037.500	1.9432	0.0520
	Post- covid	28991.125	3799945.000		
Nifty IT	Pre- covid	15684.827	251415.200	1.0039	0.3154
	Post- covid	14810.130	4303644.000		
Nifty Media	Pre- covid	1814.347	2348.840	8.8245	0.0000
	Post- covid	1275.649	20010.670		
Nifty Metal	Pre- covid	2561.727	21979.790	4.8216	0.0000
	Post- covid	1955.645	72826.070		
Nifty Pharm	Pre- covid	7967.212	52763.100	-2.6100	0.0091
	Post- covid	9530.270	2099196.000		
Nifty PSU Bank	Pre- covid	2394.528	21146.200	12.4463	0.0000
	Post- covid	1379.536	18756.000		
Nifty Realty	Pre- covid	284.719	581.936	6.8638	0.0000
	Post- covid	198.449	365.917		

Table No.4

**Nifty IT**

For the Nifty IT Index performance is not having much impact as per the Z test and it represents that the Calculated Z value is 1.0039 which is less than the Tabulated Z value that is 1.96. So here the Null hypotheses is accepted. It presents that there is no significance difference in the performance of the Nifty IT Index in the stock market.

**Nifty FMCG**

For the Nifty FMCG Index performance is not having much impact as per the Z test and it represents that the Calculated Z value is 1.94 which is less than the Tabulated Z value that is 1.96. So here the Null hypotheses is accepted. It presents that there is no significance difference in the performance of the Nifty FMCG Index in the stock market.

Z-test is conducted on the difference sector indices to measure the performance of the stock during the pre-covid and post covid times. As per the Z test there are only 2 sector which is not having the significance difference in the performance. These sectors are FMCG and IT sectors. Remaining sectors indices value is having a significance difference in the performance.

## Key Findings and Outcome

- I have studied the Bollinger band for the 11 pharmaceutical companies among them 10 companies Bollinger band showed a Fluctuation sign and during the same time the value of the stock was also in Bull run. That was in a Raising trend in the market.
- After the announcement of the Covid-19 Lockdown in the month of April the stocks were traded above the moving average curve. For about 10 trading days this was happened in all the 11 large cap pharmaceutical companies.
- RSI (Relative Strength Index) is one of the powerful indicators used by the traders in the stock market. RSI indicated a buy signal to the trader on April for about 7 companies out of 11 companies.
- In Bollinger band there was small squeeze in the stock performance that helps in the prediction of the future moment of the stock in the market. In the same way the stocks were in Bull run after the small squeeze in March end or in April beginning.
- By observing the charts and data I can say that all the 11 Pharma companies have performance was in upward trending after the announcement of the Covid-19 news.
- News led the investors to become favorable to the pharmaceutical sector. This supported the pharmaceutical sector to gain lot of attention from the investors.
- From the study we could able to see that the performance of the pharmaceutical company's stock has gained an advantage after the lockdown announcement in the country.
- From the Data set we can able to observe that 7 companies have gained 30% increase in the stock price. When it is compared with pre-covid times.
- Among the 11 large cap pharma companies only 2 Company stock was reduced apart from that 9 companies have gained the value to its stock.
- Comparison study with the different sectors indices has been conducted. As per its result only pharmaceutical indices has gained 19.62% in the market.
- The PSU Bank Indices lost its value about 42.39% in the market this was the highest loss in the indices value post-covid.
- From the Z-test we can understand the difference in the performance of the Pharma company's stock. In the study I get to know that 7 company's stocks have been impacted from the Covid-19 announcement.
- Only three company's stock performance was not impacted. Those three companies are Sun Pharmaceutical Ltd, Lupin Ltd and GlaxoSmithKline company stocks were not significantly impacted by the Covid-19 announcement.
- For the Indices Z-test is conducted by that we can observe that the pharma indices only impacted positively. Part from that an IT stocks was stable and not impacted by the announcement of the Covid-19.

## Conclusion

From the research found that there is a significant amount of impact by Covid-19 announcement on the Pharma Sectors. The few stocks performance was not had big impact apart from that every stock was impacted. By looking at overall market all the indices have been impacted in the market but pharma indices impacted positively. But IT and FMCG sector stocks were not impacted apart from these two every sector has a significant impact on its performance. This information helps the investor in making decisions at challenging time. The whole study helps an investor in understanding the market moment during Covid times.

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