

INFERRING THE IMPACT OF COVID- 19 ON THE LIQUIDITY & PROFITABILITY: A CASE STUDY OF SELECTED INDIAN PHARMACEUTICAL COMPANIES

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ABSTRACT:

Indian Pharmaceutical Companies (IPCs) have a substantial presence in the domestic and international market. Like all other sector of the economy, IPCs are also badly affected with Covid-19 pandemic. This pandemic also affected the long term and short term liquidity of all pharmaceutical companies, as the revenue and expenditure of all the companies were showing an extraordinary variation in last few years. What is the effect of pandemic on the earning and liquidity position of IPCs? The main intention of this analytical research study is to search answer to this relevant question, which is closely concerned with the advancement and persistence of the Indian pharmaceutical industry. With the help of Working Capital Analysis Simple Regression, Accounting Ratios and Student's T-Test on the financial data, this research study is an effort to find a variation in the liquidity and profitability of selected Indian pharmaceutical companies during this pandemic period.

KEY WORDS:

Indian Pharmaceutical Companies, Regression Analysis, Operating Profit Ratio, Current Ratio, Working Capital.

INTRODUCTION:

Medicines or pharmaceutical sector is equally valuable for long and healthy human life. During the last few years, Pharmaceutical companies are facing new challenges due to the spread of Covid-19. They are working not only to improve their product quality and control on their increasing production cost but they also trying to search effective and fast cure for Covid-19.

Pharmaceutical industry is major segments of Indian industries. This industry has been showing robust performance in past few decades in terms of domestic and export sales. In last one decade the performance of Indian Pharmaceutical Companies (IPCs) at world level is improving both in terms of volume and value.

The global spread of Covid-19 has brought an extraordinary impact on all the sectors of economy. The impact of corona virus pandemic has begun reflecting on IPCs also. The researchers have taken this topic with the aim of understanding the impact of Covid-19 on the profitability and short term liquidity of IPCs, on the basis of financial data for two years of Pre Covid Period and two years of present Covid Period.

1.1 Covid-19 Pandemic:

At the beginning of year 2020, the corona virus was originated from China. It has infected millions of people of this planet. So far more than 44 million people in India has infected from this pandemic. On the other hand, if we talk about the whole world, more than 561 million people have been infected. So far, more than 6.4 million people have lost their lives all over the world. India has made a commendable effort in preventing the infection of corona virus.

The year 2020 and 2021 will always be remembered in the future due to the corona virus epidemic. The whole world is still facing the outbreak of Corona right now. It has been almost 30 months since Covid-19 was declared an epidemic, experts are expecting that everything will start getting better in the coming few months, looking at the progress of corona vaccination program and the current conditions.

1.2 Indian Pharmaceutical Companies (IPCs):An Overview:

Any industry or venture directly or indirectly tied up in the research, origination, discovery, formulation, production, distribution & marketing of pharmaceuticals, chemicals, drugs or any other type of health care product is acknowledged as Pharmaceutical Industry.

In the basis of the volume, this Industry is at 3rd rank in the world. India has the second-highest number of US FDA approved pharmaceutical manufacturing plants outside the USA. India is the largest supplier of generic drugs and 12th largest exporter of the pharmaceuticals in the international market. (*Annual Report, 2020-21, Department of Pharmaceuticals, Ministry of Chemical and Fertilizers, Government of India*)

This sector currently adds to around 1.72% of GDP of India. For the financial year 2019-2020, total Annual Turnover of Pharmaceuticals was INR 28, 99,980Millionand exports wereINR 14,62,600Million. There are more than 3,000 IPCs running more than 10,500 manufacturing plants in the country. Many IPCs have global presence and recognition for the manufacturing and selling of world class pharmaceuticals. (*Annual Report, 2020-21, Department of Pharmaceuticals, Ministry of Chemical and Fertilizers, Government of India*)

LITERATURE REVIEW

Elijelly (2004) has studied the connection between the liquidity and profitability and found a significant adverse link between the profitability of the firm and the liquidity level. **Raheman & Nasr (2007)** studied the influence of working capital management on the company's profitability and fluidity and found a strong positive connection between the management of working capital and profitability.

Singh & Pandey (2008) discovered that for the success of any business the contribution of current and fixed assets is very important. They recommended that the proper management of working capital is required because it has direct impact on the liquidity of the firm. **James Clausen (2009)** stated that the current ratio indicates the organization's capacity to repay its temporary borrowings with its current assets. He also found that higher current ratio is the sign of better capacity of a company to repay its current borrowings.

Mohmad and Dr. Syed (2016) analyzed the liquidity and profitability performance of selected companies and learnt that in the terms of Quick Ratio there is vital variation between the financial presentations of pharmaceutical companies. **Panigrahi (2019)** evaluated the economic presentation of five pharma companies from Indian market for the period from 2011-12 to 2015-16. He analyzed that the profitability of these companies in this five year's period was satisfactory.

Paliwal (2020) discussed about the present situation and different opportunities available for the Pharma companies to expand and gain maximum leverage during this pandemic situation. The author has tried to explore in the statistics pertaining to the pharmaceuticals business and the relation between global Pharmaceutical market and Indian Pharma companies. **Behera & Rath (2021)** investigated the effect of the pandemic on gains from the share price Indian pharmaceutical companies. They applied an event study methodology for the research study and concluded that during the Covid-19 period the average returns of the pharmaceutical sector were progressive.

OBJECTIVES:

- i. To appraise the effect of Covid- 19 on the profitability of top ten IPCs.
- ii. To estimate the effect of Covid- 19 on the liquidity of top ten IPCs.
- iii. To measure the degree of correlation between the Working Capital and Net Revenue From Operation of top ten IPCs for pre and present pandemic Period.
- iv. To ascertain the grade of correlation between the Net Profit Ratio and Operating Profit Ratio of top ten IPCs for pre and present pandemic Period.

LIMITATIONS

- i. This study is concentrated on the measurement of liquidity and profitability through Simple Regression, Working Capital, and accounting ratios i.e. Net Profit Ratio, Operating Profit Ratio, , Current Ratio and Liquid Ratio.
- ii. This study is founded on only top ten IPCs which are selected on the basis of their consolidated revenue from operations for the year ended on 31st March 2022.
- iii. The financial data of last four financial years, from F.Y. 2018-19 to 2021-22 are only considered for this study.

HYPOTHESES:

(H1): “There is no significant change in the relationship of Net Revenue From Operation (NRFO) and the Working Capital (WC) of top ten IPCs during the pre Covid Period and Present Covid Period.”

(H2): “There is no significant change in the relationship of Operating Profit Ratio (OPR) and the Net Profit Ratio (NPR) of top ten IPCs during the pre Covid Period and Present Covid Period.”

(H3): “There is no significant change (Increase or decrease) in the Current Ratio of top ten IPCs during the pre Covid Period and Present Covid Period.”

(H4): “There is no significant change (Increase or decrease) in the Operating Profit Ratio of top ten IPCs during the pre Covid Period and Present Covid Period.”

RESEARCH METHODOLOGY

6.1 Sample Size:

For the purpose of the analysis of the financial performance of IPCs, purposive sampling method is adopted. This sampling method is best to be used when a research study is focused on comparatively small samples. Purposive sampling is useful to access a specific division of the population that shares certain features, in present study this feature is the major part of the revenue from operation of the pharma industry. So, on the basis of the consolidated revenue from operation for the financial year 2021-22, top ten IPCs are selected as purposive sample for the study.

Following are the main reasons for such sample IPCs:

- i. All these IPCs are well established and large cap companies.
- ii. In aggregate, the revenue of all these IPCs is more than INR 17,60,080 Million which is about 40% of revenue of entire pharma industry.
- iii. These ten IPCs are exporting their products to more than 100 countries across the globe.
- iv. These IPCs are the major producer of all kind of medicines and market leader in many products and divisions.
- v. The revenue model and the expenditures incurred by these companies can be taken as standard for entire pharma industry of India.

6.2 Research Period:

The period of this research study is divided in two parts for the duration of two years each. First part is Pre Covid-19 period started from 1st April 2018 to 31st March 2020 (F.Y. 2018-19 and 2019-20) and second part is Present Covid-19 period started from 1st April 2020 to 31st March 2022 (F.Y. 2020-21 and 2021-22)

6.3 Data Sources:

Present quantifiable and analytical research study is primarily based on secondary data. The annual reports and websites of the Indian Pharmaceutical Companies are the main source of data for the study.

ANALYTICAL METHOD AND TOOLS:

6.4.1. Short Term Solvency or Liquidity Ratios:

The short term solvency ratios or short term financial position ratios or liquidity ratios are for determining the safety and ability of business entity to repay its short-term debts or liabilities. Followings are three main parameters are used to assess the short term solvency of business:

i. Current Ratio or Working Capital Ratio:

Current Ratio = Current Assets / Current Liabilities

ii. Liquid Ratio or Quick Ratio or Acid Test Ratio:

The liquid ratio is the ratio of liquid assets to current liabilities. In order to calculate the liquid assets, inventories are deducted from the current assets list section. After that this amount of liquid assets is divided by the current liabilities to find out the liquid ratio.

So the formula is:

Liquid Ratio = Liquid Assets/ Current Liabilities

Liquid Assets = Current Assets - Inventories

A liquid ratio of 1: 1 is considered as ideal. The liquid ratio will vary greatly in different industries, as this is just a common view, there is no uniform standard.

iii. Working Capital or Net Working Capital :

If all the current liabilities of the business are paid by the use of all the current assets, the remaining business is known working capital. In shape of formula:

Working Capital = Current Assets - Current Liabilities.

Working capital shows the ability of a firm to repay the short term liabilities. Although the size of a large difference between the enterprises is of very limited importance compared to the absolute number.

6.4.2 Profitability Ratios:

The relationship between the profit and the sales of a business enterprise is a profitability ratio. To measure the profitability of the business under mentioned two ratios are applied::

i. Operating Profit Ratio:

The operating profit ratio represents the relationship between operating profit to the net revenue from operation or net sales. Operating profit is an excess of revenue from operation over the operating expenditures/operating cost of a business enterprise. Operating expenditures include all type recurring nature ordinary expenses, incurred during the normal course of business activities. It doesn't include extraordinary expenses, losses, incomes and gain..

Operating Profit Ratio = Operating Profit×100/ Net Revenue from Operations

ii.Net Profit Ratio:

The net profit ratio represents the relationship between net profit to the net revenue from operation. Net profit is an excess of revenue from operation over the total expenditures/ cost of a business enterprise. It covers all type recurring/no-recurring, ordinary/extraordinary expenses, losses, incomes and gains.

Net Profit Ratio = Net Profit×100/ Net Revenue from Operations

6.4.3 Hypothesis Testing Tool:

a. Multiple Regression Analysis by Ordinary Least Square (OLS) Method:

$$y = a + bx$$

Here:

For Testing H1:*y* = Working Capital (WC), a dependent variable,*a* = alpha is the intercept of the least square,*b* = beta is the slope of the regression line/coefficient,*x* = Net Revenue from Operation (NRFO), an independent variable,**For Testing H2:***y* = Net Profit Ratio (NPR), a dependent variable,*a* = alpha is the intercept of the least square,*b* = beta is the slope of the regression line/coefficient,*x* = Operating Profit Ratio (OPR), an independent variable,

For the computation of the values of 'a' and 'b', following two normal equations are used, which can be solved simultaneously by OLS Method:

$$\sum y = na + b \sum x$$

$$\sum xy = a \sum x + b \sum x^2$$

For Testing H3 and H4:**b. Student's t-Test:**

$$t = \frac{x_1 - x_2}{s} * \sqrt{\frac{n_1 * n_2}{n_1 + n_2}}$$

BREIF PROFILE OF TOP TEN IPCs:

All the top ten IPCs are integrated global pharmaceutical companies committed to providing affordable and innovative medicines for healthiest lives.

TABLE 01: A BREIF PROFILE OF TOP TEN IPCs

S.N o.	Name of the IPC	Registered Office	Est. Year	Revenue From Operations (F.Y.2021-22) (In Million INR)
1	Sun Pharmaceutical Industries Ltd.	Mumbai	1983	384,264.20
2	AurobindoPharma Ltd.	Hyderabad	1986	233,665.50
3	Cipla Ltd.	Mumbai	1935	216,233.60
4	Dr.Reddy's Laboratories Ltd.	Hyderabad	1984	205,144.00
5	Lupin Ltd.	Mumbai	1968	164,054.80
6	ZydusLifesciences Ltd.	Ahmedabad	1952	152,652.00
7	Glenmark Pharmaceuticals Ltd.	Mumbai	1977	123,049.00
8	Alkem Laboratories Ltd.	Mumbai	1973	106,341.90
9	Divi's Laboratories Ltd.	Hyderabad	1990	89,598.30
10	Torrent Pharmaceuticals Ltd.	Ahmedabad	1959	85,080.00

Source: Annual Reports of Companies.

PRE & PRESENT COVID-19: PROFITABILITY ANALYSIS OF TOP TEN IPCs:

The profitability ratios are for determining the profit earning capacity of a business entity with respect of its revenue from operation or turnover. Followings twomain parameters are used to assess the profitability of the business:

TABLE 02:PRE & PRESENT COVID-19: OPERATING PROFIT RATIO OF TOP TEN IPCs
(From F.Y. 2018-19 to 2021-22)

S. No.	Name of the IPC	Operating Profit Ratio (Pre Covid Period)		Operating Profit Ratio(Present Covid Period)	
		2018-19	2019-20	2020-21	2021-22
1	Sun Pharmaceutical Industries Ltd.	17.52	16.3	21.44	23.55
2	Aurobindo Pharma Ltd.	16.52	16.64	18.67	15.12
3	Cipla Ltd.	13.02	13.05	17.33	17
4	Dr.Reddy's Laboratories Ltd.	14.84	10.44	14.89	13.88
5	Lupin Ltd.	12.19	9.941	11.22	-8.48
6	Zydus Lifesciences Ltd.	18.77	13.46	18.44	18.38
7	Glenmark Pharmaceuticals Ltd.	11.68	10.23	12.38	13.98
8	Alkem Laboratories Ltd.	13.14	15.38	21.1	17.48
9	Divi's Laboratories Ltd.	38.62	34.39	38.87	41.86
10	Torrent Pharmaceuticals Ltd.	12.31	15.25	19.35	20.32
MEAN OPERATING PROFIT RATIO (On the basis of Financial Years)		16.86	15.51	19.37	17.31
MEAN OPERATING PROFIT RATIO (On the basis of Pre & Present Covid Period)		16.18		18.34	

Source : Own computation using MS Excel on the basis of Annual Reports of Companies.

Analysis:

Divi's Lab has the highest operating profit ratio of during both the period. While operating profit ratio of Lupin is showing a significant decrease. An improvement of almost 14% in the mean operating profit ratio is observed from the above data. On the basis of these four years data it is observable that, the operating profit of all the companies is improved significantly.

TABLE 03:PRE & PRESENT COVID-19: NET PROFIT RATIO OF TOP TEN IPCs
(From F.Y. 2018-19 to 2021-22)

S. No.	Name of the IPC	Net Profit Ratio (Pre Covid Period)		Net Profit Ratio (Present Covid Period)	
		2018-19	2019-20	2020-21	2021-22
1	Sun Pharmaceutical Industries Ltd.	11.19	12.95	6.89	8.86
2	Aurobindo Pharma Ltd.	12.28	12.51	21.94	11.46
3	Cipla Ltd.	9.45	9.27	12.65	11.84
4	Dr.Reddy's Laboratories Ltd.	12.34	11.25	9.99	9.80
5	Lupin Ltd.	4.27	-1.81	8.22	-9.32
6	Zydus Lifesciences Ltd.	14.53	8.51	15.13	30.84
7	Glenmark Pharmaceuticals Ltd.	9.53	7.46	8.98	8.16
8	Alkem Laboratories Ltd.	10.65	14.03	18.53	15.8
9	Divi's Laboratories Ltd.	28.16	26.02	28.93	33.64
10	Torrent Pharmaceuticals Ltd.	5.85	13.17	15.87	9.23
MEAN NET PROFIT RATIO (On the basis of Financial Years)		11.82	11.34	14.71	13.03
MEAN NET PROFIT RATIO (On the basis of Pre & Present Covid Period)		11.58		13.87	

Source : Own computation using MS Excel on the basis of Annual Reports of Companies.

Analysis:

The net profit ratio of Cipla, Alkem and Torrent is screening a healthy enhancement. Divi's Lab and Zydus have the highest net profit ratio for both the period. But the net profit ratio of Sun, Lupin, Dr. Reddy's Lab and Glenmark is presenting a significant reduction. An

improvement of almost 20% in the mean net profit ratio is observed from the above data. The summary inference is that, the net profit ratio of IPCs has a mixed trend.

PRE & PRESENT COVID-19: LIQUIDITY ANALYSIS OF TOP TEN IPCs:

For the assessment of the liquidity of IPCs, Following main parameters are used:

TABLE 04:PRE & PRESENT COVID-19: CURRENT RATIO OF TOP TEN IPCs
(From F.Y. 2018-19 to 2021-22)

S. No.	Name of the IPC	Current Ratio (Pre Covid Period)		Current Ratio (Present Covid Period)	
		2018-19	2019-20	2020-21	2021-22
1	Sun Pharmaceutical Industries Ltd.	1.79	2.02	1.89	2.04
2	Aurobindo Pharma Ltd.	1.28	1.44	1.86	2.22
3	Cipla Ltd.	3.29	2.66	2.87	2.99
4	Dr.Reddy's Laboratories Ltd.	1.88	1.75	1.8	1.82
5	Lupin Ltd.	2.26	1.67	1.66	1.51
6	Zydus Lifesciences Ltd.	1.16	1.05	1.11	1.55
7	Glenmark Pharmaceuticals Ltd.	1.67	1.65	1.75	1.77
8	Alkem Laboratories Ltd.	1.9	1.69	1.92	1.76
9	Divi's Laboratories Ltd.	5.49	5.05	5.55	6.99
10	Torrent Pharmaceuticals Ltd.	0.98	0.91	1.6	1.94
MEAN CURRENT RATIO (On the basis of Financial Years)		2.17	1.99	2.2	2.46
MEAN CURRENT RATIO (On the basis of Pre & Present Covid Period)		2.08		2.33	

Source:Own computation using MS Excel on the basis of Annual Reports of Companies.

Analysis:

The current ratio of Zydus, Torrent and Aurobindo is presenting a noticeable enhancement. The highest current ratio belongs to Divi's Lab for both the periods. On other hand the current ratio of Lupin is showing a significant cut; the current ratios of Cipla, Alkem and Dr. Reddy's Lab have a negligible decline.

In the terms of combined current ratio of all the companies a significant improvement is visible in present Covid period as compare to the pre Covid period. An improvement of almost 10% in the mean current ratio is observed from the above data. On the basis of these four years data it is well clear that, the short term financial position of all the companies is good, as pre and present Covid period all the companies have current ratio of 1 or more than 1. Overall short term

TABLE 05:PRE & PRESENT COVID-19: LIQUID RATIO OF TOP TEN IPCs
(From F.Y. 2018-19 to 2021-22)

S. No.	Name of the IPC	Liquid Ratio (Pre Covid Period)		Liquid Ratio (Present Covid Period)	
		2018-19	2019-20	2020-21	2021-22
1	Sun Pharmaceutical Industries Ltd.	1.34	1.51	1.33	1.51
2	Aurobindo Pharma Ltd.	0.67	0.77	1.01	1.3
3	Cipla Ltd.	2.24	1.67	1.85	1.91
4	Dr. Reddy's Laboratories Ltd.	1.31	1.26	1.24	1.3
5	Lupin Ltd.	1.63	1.3	1.17	0.95

6	Zydus Lifesciences Ltd.	0.79	0.72	0.7	1.07
7	Glenmark Pharmaceuticals Ltd.	1.11	1.13	1.21	1.23
8	Alkem Laboratories Ltd.	1.22	1.13	1.28	1.13
9	Divi's Laboratories Ltd.	3.4	3.04	3.62	4.62
10	Torrent Pharmaceuticals Ltd.	0.6	0.52	1.05	1.38
MEAN LIQUID RATIO <i>(On the basis of Financial Years)</i>		1.43	1.3	1.45	1.64
MEAN LIQUID RATIO <i>(On the basis of Pre & Present Covid Period)</i>		1.37		1.55	

Source : Own computation using MS Excel on the basis of Annual Reports of Companies.

Analysis:

In the terms of the liquid ratio of top ten IPCs for the last four years, significant difference is visible in all of these companies. Just like the current ratio status, the liquid ratio of Zydus, Torrent and Aurobindo is showing a significant improvement, along with the highest liquid ratio of Divi's Lab during the pre and present Covid period. On other hand a significant decrease is also visible in the liquid ratio of Cipla and Lupin; however the current ratios of Alkem and Dr. Reddy's Lab have a marginal decrease.

In the terms of combined ratio of all the companies a substantial enhancement is observable. An enhancement of almost 15% in the mean liquid ratio is witnessed from the above data. On the basis of these four years data it is well clear that, the short term financial position of all the companies is good, as pre and present Covid period all the companies have liquid ratio of more than 0.5. Overall short term financial positions of these companies have been improved in this pandemic period.

TABLE 06:PRE & PRESENT COVID-19: WORKING CAPITAL OF TOP TEN IPCs
(From F.Y. 2018-19 to 2021-22)

S. No.	Name of the IPC	Working Capital (Pre Covid Period) (In Million INR)		Working Capital (Present Covid Period) (In Million INR)	
		2018-19	2019-20	2020-21	2021-22
1	Sun Pharmaceutical Ind. Ltd.	137,295.70	159,477.30	142,955.50	178,144.30
2	Aurobindo Pharma Ltd.	33,117.30	50,257.60	91,584.60	99,667.10
3	Cipla Ltd.	86,549.20	73,107.00	85,898.90	97,979.60
4	Dr. Reddy's Laboratories Ltd.	52,128.00	53,850.00	64,465.00	80,165.00
5	Lupin Ltd.	77,237.10	61,880.10	55,502.70	41,812.40
6	Zydus Lifesciences Ltd.	11,556.00	4,460.00	8,547.00	42,684.00
7	Glenmark Pharmaceuticals Ltd.	26,757.40	26,776.40	31,585.60	35,929.20
8	Alkem Laboratories Ltd.	19,986.00	22,527.20	33,247.70	36,300.90
9	Divi's Laboratories Ltd.	38,033.00	37,530.00	50,622.50	71,559.50
10	Torrent Pharmaceuticals Ltd.	-1,280.00	-4,730.00	29,140.00	41,360.00
MEAN WORKING CAPITAL <i>(On the basis of Financial Years)</i>		48,137.97	48,513.56	59,354.95	72,560.20
MEAN WORKING CAPITAL <i>(On the basis of Pre & Present Covid Period)</i>		48,325.77		65,957.58	

Source: Own computation using MS Excel on the basis of Annual Reports of Companies.

Analysis:

In the terms of working capital for the last four years, a substantial increase is visible in almost all of these companies. As an exception Lupin is showing the decrease in working

capital during this period. The negative working capital of Torrent now converted into positive in present Covid period. There is a remarkable increase in working capital of Zydus (269%), Aurobindo (200%), Divi's (88%) and Alkem (81%) from the pre to present Covid period. On other hand a modest increase is also visible in the working capital of Sun, Cipla, Dr. Reddy and Glenmark.

An advancement of 36% in the mean working capital is visible in present Covid period as compare to the pre Covid period. On the basis of these four years data it is well clear that, all the companies have increased their working capital in present Covid period.

TEST OF HYPOTHESIS:

TABLE 07: TEST OF FIRST HYPOTHESIS BY MULTIPLE REGRESSION MODEL

(H1): "There is no significant change in the relationship of Net Revenue From Operation (NRFO) and the Working Capital (WC) of top ten IPCs during the pre Covid Period and Present Covid Period."

<i>PRE COVID (F.Y. 2018-19)</i>				
<i>Dependent Variable</i>		<i>Working Capital (WC)</i>		
<i>Independent Variable</i>		<i>Net Revenue From Operation (NRFO)</i>		
<i>Sample</i>		<i>10 IPCs from F.Y. 2018-2019</i>		
<i>Included observations:</i>		<i>10</i>		
<i>Multiple R</i>		0.789345188		
<i>R Square</i>		0.623065825		
<i>Adjusted R Square</i>		0.575949053		
<i>Standard Error</i>		27150.33336		
<i>Variable</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
<i>a (Intercept)</i>	-15611.85	19520.25	-0.79978	0.446935
<i>b (Slope)</i>	0.469169	0.129018	3.636463	0.006623
<i>PRESENT COVID (F.Y. 2021-22)</i>				
<i>Dependent Variable</i>		<i>Working Capital (WC)</i>		
<i>Independent Variable</i>		<i>Net Revenue From Operation (NRFO)</i>		
<i>Sample</i>		<i>10 IPCs from F.Y. 2021-22</i>		
<i>Included observations:</i>		<i>10</i>		
<i>Multiple R</i>		0.914332		
<i>R Square</i>		0.836004		
<i>Adjusted R Square</i>		0.815504		
<i>Standard Error</i>		19238.9		
<i>Variable</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
<i>a (Intercept)</i>	-7342.73	13912.82	-0.52777	0.611981
<i>b (Slope)</i>	0.453972	0.071088	6.386048	0.000212

Source: Own Computation, using MS Excel, on the basis of Annual Reports of IPCs.

Analysis:

i. R-square:

During both the periods, the values of R-square or R-square adjusted are almost the same and express us how much independent variables are predicting (impacting) dependent

variables. In 2018-19 , the value of r square is 0.623, so 62.3% of independent variables are predicting WC. On other side in 2021-22 the value of R- square is 0.836, so 83.6% of independent variables are predicting WC. The comparison of both the periods shows that, NRFO (independent variable) has a higher degree of correlation with WC

ii. P-Values:

With the help of Multiple Regression model, an attempt has been made to analyse the impact of Net Revenue From Operation (NRFO) on the Working Capital (WC) for Pre and present Covid period. The equation Results of the regression analysis highlighted that, for both the periods $P < 0.05$, for pre it is 0.006623 and in case of present period it is 0.000212. Following the rule of thumb which states that if the p-value is lesser than 5%, the relationship is said to be significant if it is greater than 5%, it is insignificant. It means there is a significant correlation between the NRFO and WC during the pre and present Covid period.

iii. Regression Equation:

On substituting the results of the coefficients of a (intercept) and b (slope) in the regression equation ($y = a + bx$), it can be established that:

• For Pre Covid Period:

$$WC = -15611.85 + 0.469169(NRFO)$$

It means when the NRFO in this period is INR 1,00,000 Million then the amount of WC will be as under:

$$WC = -15611.85 + (0.469169 \times 1,00,000)$$

$$WC = -15611.85 + 46916.9$$

$$WC = 31,305.05$$

On interpreting the results in the terms of percentage, the working capital is 31.3% ($31,305.05 \times 100 / 1,00,000$) of NRFO of top ten IPCs.

• For Present Covid Period:

$$WC = -7342.73 + 0.453972 (NRFO)$$

It means when the NRFO in this period is INR 1,00,000 Million then the amount of WC will be as under:

$$WC = -7342.73 + (0.453972 \times 1,00,000)$$

$$WC = -7342.73 + 45397.2$$

$$WC = 38,054.47$$

On interpreting the results in the terms of percentage, the working capital is 38.05% ($38,054.47 \times 100 / 1,00,000$) of NRFO of top ten IPCs.

iv. Hypothesis Test Result:

As the summary interpretation, during pre Covid period WC was 31% of NRFO which was increased to 38% during present Covid Period. In this way a substantial increase of 7% is visible in the working capital for the comparative period.

So H1 is rejected and alternative hypothesis is accepted as:

“There is a significant change in the relationship of Net Revenue From Operation (NRFO) and the Working Capital (WC) of top ten IPCs during the pre Covid Period and Present Covid Period.”

TABLE 08: TEST OF SECOND HYPOTHESIS BY MULTIPLE REGRESSION MODEL

(H2): “There is no significant change in the relationship of Operating Profit Ratio (OPR) and the Net Profit Ratio (NPR) of top ten IPCs during the pre Covid Period and Present Covid Period.”

PRE COVID (F.Y. 2018-19)				
Dependent Variable		Net Profit Ratio (NPR)		
Independent Variable		Operating Profit Ratio (OPR)		
Sample		<i>10 IPCs from F.Y. 2018-2019</i>		
Included observations:		<i>10</i>		
Multiple R		0.951948189		
R Square		0.906205355		
Adjusted R Square		0.894481024		
Standard Error		2.110999807		
Variable	Coefficients	Standard Error	t Stat	P-value
<i>a (Intercept)</i>	-1.171824	1.622053	-0.72243	0.490605
<i>b (Slope)</i>	0.770822	0.087677	8.791628	0.000022
PRESENT COVID (F.Y. 2021-22)				
Dependent Variable		Net Profit Ratio (NPR)		
Independent Variable		Operating Profit Ratio (OPR)		
Sample		<i>10 IPCs from F.Y. 2021-22</i>		
Included observations:		<i>10</i>		
Multiple R		0.822598169		
R Square		0.676667748		
Adjusted R Square		0.636251217		
Standard Error		7.301393449		
Variable	Coefficients	Standard Error	t Stat	P-value
<i>a (Intercept)</i>	-1.070526	4.148287	-0.25806	0.802872
<i>b (Slope)</i>	0.814693	0.199107	4.091742	0.003477

Source: Own Computation, using MS Excel, on the basis of Annual Reports of IPCs.

Analysis:

i. R-square:

During both the periods, the values of R-square or R-square adjusted are not same. In 2018-19, the value of r square is 0.906, so 90.6% of independent variables are predicting NPR. On other side in 2021-22 the value of R- square is decreased significantly at 0.676, so 67.6% of independent variables are predicting NPR. The comparison of both the periods shows that, OPR (independent variable) has a higher degree of correlation with NPR during the pre Covid period, while during present Covid period there is modest degree of correlation exists.

ii. P-Values:

The equation Results of the regression analysis highlighted that, for both the periods $P < 0.05$, for pre it is 0.000022 and in case of present period it is 0.003477. Following the rule of thumb which states that if the p-value is lesser than 5%, the relationship is said to be significant if it is greater than 5%, it is insignificant. It means there is a significant correlation between the OPR and NPR during the pre and present Covid period.

iii. Regression Equation:

On substituting the results of the coefficients of a (intercept) and b (slope) in the regression equation ($y = a + bx$), it can be established that:

- **For Pre Covid Period:**

$$\text{NPR} = -1.171824 + 0.770822(\text{OPR})$$

It means when the OPR in this period is 10 percent then the percentage of NPR will be as under:

$$\text{NPR} = -1.171824 + (0.770822 \times 10)$$

$$\text{NPR} = -1.171824 + 7.7082$$

$$\text{NPR} = 6.5362 \text{ OR } 6.5362\%$$

- **For Present Covid Period:**

$$\text{NPR} = -1.070526 + 0.814693(\text{OPR})$$

It means when the OPR in this period is 10 percent then the percentage of NPR will be as under:

$$\text{NPR} = -1.070526 + (0.814693 \times 10)$$

$$\text{NPR} = -1.070526 + 8.1469$$

$$\text{NPR} = 7.0755 \text{ OR } 7.0755\%$$

iv. Hypothesis Test Result:

As the summary interpretation, during pre Covid period NPR was 6.54% on the OPR of 10% which was increased to 7.07% during present Covid Period. In this way a nominal increase of 0.53% is visible.

So H2 is accepted as:

(H2): “There is no significant change in the relationship of Operating Profit Ratio (OPR) and the Net Profit Ratio (NPR) of top ten IPCs during the pre Covid Period and Present Covid Period.”

TABLE 09: TEST OF THIRD HYPOTHESIS BY STUDENT’S T-TEST

(H3): “There is no significant change (Increase or decrease) in the Current Ratio of top ten IPCs during the pre Covid Period and Present Covid Period.”

<i>Particulars</i>	<i>Pre Covid (2018-19)</i>	<i>Present Covid (2021-22)</i>
No. IPCs (n)	10	10
Mean	2.17	2.459
Variance	1.6065	2.4413
Stand. Dev.	1.2675	1.5625
Student’s T – Test	0.454	
Degree of freedom	18	
Critical Value	1.74	
Result	Calculated Value < Critical Value 0.454 < 1.74 Ho1 : Accepted	

Source: Own computation using T-Test Formula and Table

TABLE 10: TEST OF FOURTH HYPOTHESIS BY STUDENT’S T-TEST

(H4): “There is no significant change (Increase or decrease) in the Operating Profit Ratio of top ten IPCs during the pre Covid Period and Present Covid Period.”

<i>Particulars</i>	<i>Pre Covid (2018-19)</i>	<i>Present Covid (2021-22)</i>
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No. IPCs (n)	10	10
Mean	16.86	17.31
Variance	64.39	149.39
Stand. Dev.	8.02	12.22
Student's T – Test	0.0937	
Degree of freedom	18	
Critical Value	1.74	
Result	<i>Calculated Value < Critical Value</i> <i>0.0937 < 1.74</i> <i>Ho2 : Accepted</i>	

Source: Own computation using T-Test Formula and Table

FINDINGS AND CONCLUSION:

The impact of Covid-19 on the profitability and short term financial position of the IPCs may be summarized as under:

- During the research period, a considerable growth of 14% in the mean operating ratio and 20% in the mean net profit ratio is a strong indication of improvement in the profitability of top ten IPCs.
- In last four years Current Ratio of top IPCs is showing a significant increase of 10%, it means their short financial position has improved during the present Covid period. However the average current ratio is still below the ideal ratio of 2:1.
- In the terms of combined Liquid Ratio of all the companies, a substantial enhancement, asan enhancement of almost 15% is witnessed. The short term financial position of all the companies is good, as all the companies have liquid ratio of more than 0.5. Overall short term financial positions of these companies have been improved in this pandemic period.
- In the terms of the working capital of top ten IPCs for the last four years, significant increase is visible in almost all of these companies. A considerable growth of 36% is visible in the mean working capital of all the companies. It is observed that, all the companies have increased their working capital in present Covid period.
- As the summary interpretation of Regression Analysis results of Working Capital (WC) and Net Revenue from Operation (NRFO), there is a significant correlation between the NRFO and WC during the pre and present Covid period as for both the periods p value < 0.05. It is also noticeable that during pre Covid period WC was 31% of NRFO which was increased to 38% during present Covid Period. It leads to a substantial increase of 7%. It reflects a significant change in the relationship of WC and NRFO during the research period.
- Interpretation of Regression Analysis of Net Profit Ratio (NPR) and Operating Profit Ratio (OPR) confirms that there is a significant correlation between the OPR and NPR during the pre and present Covid period. During present Covid period NPR was increased from 6.53% to 7.07%. It leads to a nominal increase of 0.53%. It indicates that there is no significant variation in the NPR and OPR relationship.

There is noteworthy impact of Covid-19 on the profitability and liquidity of the IPCs. The operating profit ratio, net profit ratio, liquid ratio and current ratio are showing an upward

trend. In this period, the operating expenditures of these companies also showing a substantial increase, as their working capital is also showing a significant increase. But due to the increase in the revenue form operation these IPCs are manage to improve their profitability also. The profitability and the liquidity of IPCs are now much healthier as compare to the pre Covid period.

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