Export Performance in Indian Drugs & Pharmaceutical Industry in the Post-TRIPs Period[1]

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Abstract

Indian Drugs & Pharmaceutical industry has been provided immense protection since the early years of 1970s. As a result the exports from this industry has increased manifold. However the industry has witnessed a dramatic change in the policy environment after the formation of World Tread Organization (WTO) in 1995. India, being a signatory member of WTO, adopted Trade Related Intellectual Property Rights (TRIPs) Agreement. This agreement represents an essential break with the past in which India had only weak level of patent protection. It is expected that the new policy environment may have adverse effect on the export performance of the industry. In this context this paper examines the impact of new patent regime on export performance of Indian pharmaceutical industry. The results of the study show that there is no evidence of adverse effect on the export performance of Indian pharmaceutical industry in the post -TRIPs period rather it has increased significantly during the post-TRIPs period. Moreover, findings of product level analysis reflect that, annual as well as average value of export of both the products (i.e. bulk drugs and formulations) has increased in post-TRIPs period.

Keywords: Export, Drugs, Pharmaceutical, TRIPs, WTO.

Introduction

During the first two decades of the planning period (1950 to 1970), growth of Indian drugs & pharmaceutical industry was very slow and industry was dominated by Foreign Companies. With a view to develop a self-reliant indigenous industry, Government took various protective steps in 1970s. One such a step was the adoption of Patent Act 1970. But, after the formation of WTO, the industry has witnessed a dramatic change with respect to policy environment. India, being a signatory member of WTO, formulated its Patent Act in accordance with the TRIPs Agreement of WTO. The New Patent Act is likely to pose some certain serious challenges for the industry in general and export performance in particular. In this background, this paper presents the analysis of export performance of Indian pharmaceutical industry in post -TRIPs period.

Objective of the Study

The basic objective of the paper is to study the export performance of Indian pharmaceutical industry in the post-TRIPs period.

Review of Literature

The issue has been matter of debate in the academic arena and in the recent past, various studies have been conducted by various scholars. The study conducted by *Grace (2004)* revealed that the prospects of changing intellectual property on pharmaceutical industry are extremely positive for the future of the Indian pharmaceutical industry. *Chaudhuri (2005)* arrived at the similar conclusions. *Ravinder Jha (2007)* in his study analyzed top 15 pharmaceutical companies since 1995 with respect to their export orientation, import dependence and stimulus to research and development. He found that the Indian pharmaceutical industry is shifting its focus away from the domestic market to the generics market in the developed world which is going to expend in next two years when many drugs are going to be off-patented. Although India has become a net exporter of pharmaceutical, the import dependence on bulk drugs has steadily increased over the last 10 years. He also found that due to structural bottlenecks and the risk and time involved, big domestic firms do not spend the required amounts of research and development. *EXIM Bank (2007)* had analyzed the performance of Indian Pharmaceutical Industry in changed policy environment and found that, many Indian pharmaceutical

companies have not only shown good performance domestically but have also been able to establish their foothold in overseas markets.

Reji K Joseph (2009) examined the India's trade in drugs and pharmaceuticals in the liberalization period. Using industry level data on export and import of drugs and pharmaceutical, accessed from CMIE prowess database of 'India Trade' covering the period 1990-2007, the study found that there has been a decline in the growth rate of exports of intermediates and bulk drugs and formulations. Ravi Kiran and Sunita Mishra (2011) analyzed the impact of TRIPS on R&D, exports and patenting activity of the Pharmaceutical Industry of India. In their study, industry level analysis showed that the annual growth rate of India's pharmaceuticals exports increased marginally from 5.29 percent in pre-TRIPS period to 5.68 percent in the post-TRIPS period. The same result was observed in the case of analysis of the firm level export performance. In another study, conducted by Reji K Joseph (2012), it was found that pharmaceutical industry become more export oriented under the changed policy environment, and of two export category (viz. Bulk drugs and formulation) the focus has shifted to formulations. As for as the bulk drugs is concerned it has declined and therefore import of bulk drugs has increased. The study also found that dependency on China in bulk drugs (more than 50 percent of bulk drugs and other raw material are now imported from China) puts the industry at risk. The findings of the study were based on the product level data of Indian pharmaceutical industry.

Tripathi and Dubey (2014) made an attempt to observe the trade performance of Indian pharmaceutical industry under the new patent regime which came in power with the adoption of TRIPs agreement. The study found that there is no significant difference in trend in export growth for pre-TRIPs and Post-TRIPs period.

Methodology of the Study

The analysis of export performance was carried out in two levels – I- *industry level* and II- *product level* for the period 1995-2015. Industry level export performance was analyzed in both absolute and relative terms. In absolute term, exact figures of export of the industry were depicted while in relative term export was calculated as a percentage of total sales as well as the share of Indian pharmaceuticals in total export of India. Product level export performance was analyzed by grouping the pharmaceutical product into Bulk drugs and formulation using SITC classification of UN. After classifying the product, analysis was carried out in absolute and relative term. In absolute term exact figures of export of bulk drugs and formulations was calculated while in relative term share of bulk drugs and formulations in total export of pharmaceutical products was calculated. For the analysis of export performance, data were obtained from the different sources covering the period 1995-2015. The entire period was divided in to two sub periods – pre-TRIPs period (1995-1999) and TRIPs period (2000-2015). The TRIPs period was further divided in to transition period (2000-2004) and post-TRIPs period (2005-2015). Industry level data accessed from CMIE prowess database of Industry outlook and Product level data accessed from CMIE prowess database of India Trade. The obtained result and findings of the study are presented bellow.

Results on Industry Level Export Performance
Result on Absolute Export Performance

On the basis of collected data, year-wise computed value of India's absolute values export and import of Indian drugs and pharmaceutical industry for the period of study i.e. 1995 – 2015, are exhibited in Table–I-1.

Table–I-1
Export and Import in Drugs and Pharmaceuticals
(Values are in Rs. billions)

	Pre TRIPs Period					TRIPs Period															
						Transition Period					Post TRIPs Period										
Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export	16.69	23.91	28.29	33.23	36.21	45.16	54.50	69.17	92.18	120.10	133.14	166.20	224.06	266.37	330.17	379.78	444.84	556.76	631.70	753.56	809.16
Import	14.68	21.08	21.40	23.12	27.09	27.30	32.64	35.69	47.34	50.79	57.37	80.55	94.84	108.23	128.00	143.17	171.34	187.49	200.13	232.00	245.71

Source: Computed from the data collected from 'Industry Outlook'.

The results exhibited in second row of the above table show increasing trend of export over the entire period. Table revels that export in drugs and pharmaceuticals has increased from Rs. 16.69 billion in 1995 to Rs. 36.21 billion in 1999, Rs. 120.10 billion in 2004 and Rs. 809.16 billion in 2015. Thus, these results exhibit continuously increasing trend in exports of drugs and pharmaceutical industry over the entire period. Likewise export, the third row of the table exhibits continuously increasing trend in import over the entire period. Import has increased from Rs. 14.68 billion in 1995 to Rs. 27.09 billion in 1999, Rs. 50.79 billion in 2004 and Rs.245.71 billion in 2015.

The absolute export performance was also examined on the basis of polynomial trend line presented in the figure–I-1. In this figure, dotted line shows the actual values while smooth curve shows the polynomial trend values. Figure depicts a continuous upward rising trend in the export of Indian pharmaceutical industry throughout the entire period of study (1995-2015).

Figure–I-1
Trend in Drugs and Pharmaceutical Export

$$y = 2.859x^2 - 25.10x + 73.62$$
$$R^2 = 0.994$$
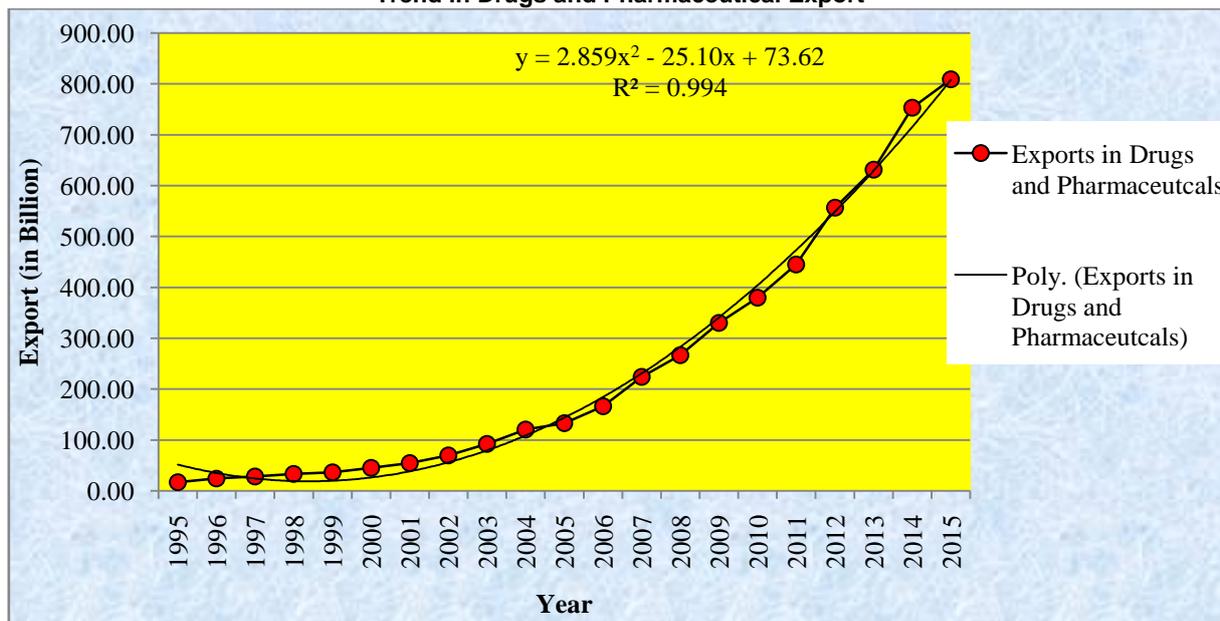
Source: Growth curve and trend line has been obtained on the basis of Table–1.

To make a comparison between export and imports, separate trend line were plotted. These trend lines are depicted in figure–I-2. It is evident from the figure that, though, after the year 2002, both export and import shows increasing trend, but export in drugs and pharmaceutical shows more growth from the year 2002.

Figure–I-2
Comparative Analysis of Trend in Export and Import
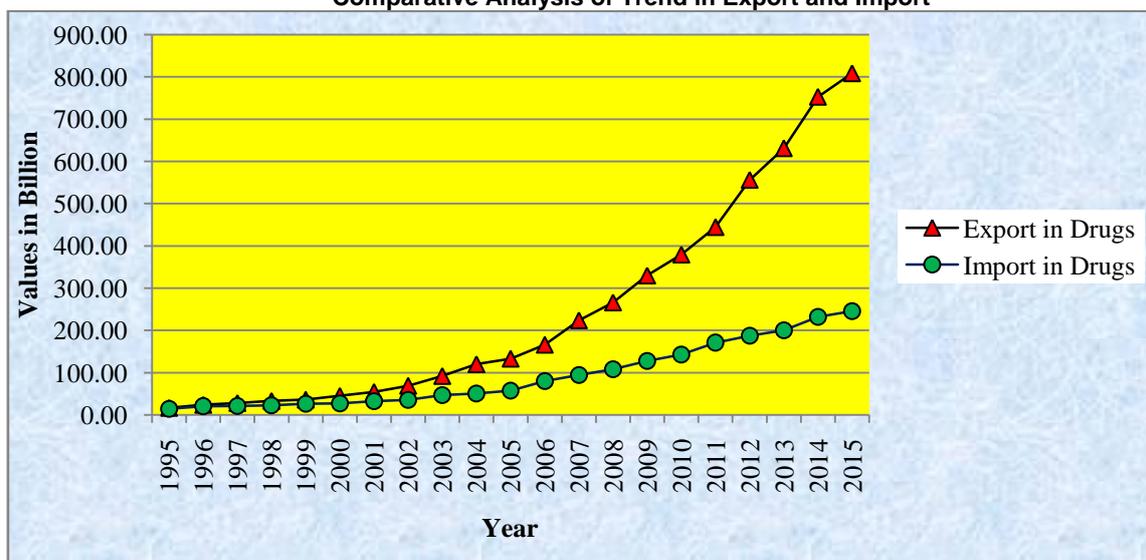
Source: Growth Line has been plotted on the basis of table–1.

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The comparative result of export and import of pharmaceutical industry are presented in the table–I-2. This table reflects that both export and import, has increased significantly during the post-TRIPs period as compared to the pre-TRIPs period. The computed values of t-statistic in the table also suggest the difference is statistically significant. These results, therefore, reject the hypothesis that export performance of Indian drugs and pharmaceutical industry in the post-TRIPs period is not significantly different from the export performance of pre-TRIPs period. Therefore, result shows that there is no adverse effect on the export performance of Indian pharmaceuticals industry in post TRIPs period, rather favorable effect has been found.

Table–I-2
Comparative Analysis of Export
(Average value in billions)

Indicator	Pre TRIPs Period (1995-1999)	TRIPs period		t-statistic[#]	t-statistic[§]
		Transition (2000-2004)	Post TRIPs (2005-2015)		
Export	27.67	76.22	426.88	-3.47471[*]	-3.28499[*]
Import	21.47	38.75	149.89	-3.53797[*]	-3.88544[*]

Source: Computed on the basis of data presented in the table–1.

#. Values of t-statistic are obtained under the Null Hypothesis H_0: $(EXP_{2000-2004} - EXP_{1995-1999}) = 0$ and alternative Hypothesis H_1: $EXP_{2000-2004} \neq EXP_{1995-1999}$.

§. Values of t-statistic are obtained under the Null Hypothesis H_0: $(EXP_{2005-2015} - EXP_{2000-2004}) = 0$ and alternative Hypothesis H_1: $EXP_{2005-2015} \neq EXP_{2000-2004}$.

*. Significant at 1 % level

Result on Relative Export Performance

Absolute figures of export depicted in table-I-1 show increasing trend with some fluctuations. Therefore it may not reflect the true picture of the existing situation. Hence, the relative measurement of export performance in drugs and pharmaceutical can be better indicator. So, we have measured export of drugs in relation to total export of India i.e share of export.

The computed values of year wise share of export of pharmaceutical industry in total export of India for the entire period is presented in the table–I-3. In this table, if we look at the two end point of the entire period, we find that share of export has increased, as export share has gone up to 2.84 percent in 2015 from 2.02 percent in 1995. But the yearly increment in the share of export is not found consistent as the table depicts that the trend value has reached at the highest value in 2005, and thereafter it is declining. Thus it is evident that share of export of pharmaceutical industry has decline after the implementation of the agreement of TRIPs. This result shows the adverse effect on the export performance of pharmaceutical industry after the implementation of TRIPs agreement.

Table–I-3
Share of Export of Pharmaceuticals in Total export of from India
(Values in Percentage)

Year	Pre TRIPs Period					TRIPs Period															
						Transition Period					Post TRIPs Period										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Share of Export	2.02	2.25	2.38	2.55	2.59	2.77	2.70	3.31	3.61	4.09	3.55	3.64	3.92	4.06	3.93	4.49	3.89	3.80	2.60	2.67	2.84

Source: Computed from 'Industry Outlook'.

The comparative result of share of export is presented in table–I-4. This table reflects that share of export of the industry in total export of India shows increase in the post-TRIPs period (3.58 percent) as compared to the pre-TRIPs period (2.36 percent). But the value of t-statistics, presented in last column, suggest that this change is not found statistically significant.

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Table–I-4
Comparative Analysis of Share of Export
(Average value in Percentage)

| Indicator | Pre TRIPs Period | TRIPs period | | t-statistic# | t-statistic§ |
| | | Transition | Post TRIPs | | |
	(1995-1999)	(2000-2004)	(2005-2015)		
Share of Export	2.36	3.29	3.58	-3.33916*	-0.87155

Source: Computed from 'Industry Outlook'.

\#. Values of t-statistic are obtained under the Null Hypothesis H_0: (GSHARE$_{2000-2004}$ – GSHARE$_{1995 – 1999}$) =0 and alternative Hypothesis H_1: GSHARE$_{2000-2004}$ ≠ GSHARE$_{1995 – 1999}$.

§. Values of t-statistic are obtained under the Null Hypothesis H_0: (GSHARE$_{2005-2015}$ – GSHARE$_{2000 – 2004}$) =0 and alternative Hypothesis H_1: GSHARE$_{2005-2015}$ ≠ GSHARE$_{2000 – 2004}$.

*. 1% level of Significance.

Results on Product Level Export Performance

This section presents the analysis of export performance of Indian pharmaceutical industry at product level (viz. bulk drugs and formulations). Likewise previous section, the analysis was carried out in terms of absolute as well as relative measurement of export performance of bulk drugs and formulations for the entire period of study (1995-2015). The obtained results and findings of the study are discussed bellow.

Result on Absolute Export of Bulk Drugs

On the basis of collected data, year-wise computed value of export of bulk drugs of Indian pharmaceutical industry for the period of study i.e. 1995-2015, is exhibited in table–II.1. The result, presented in the third row of the table shows the increasing tendency of export of bulk drugs over the entire period. The rapid increment in the export of bulk drugs during the post-TRIPs period may be due to the fact that expenditure on research and development activities of large firms has increased many folds during the product patent environment.[2] And also because of the small players, who were the major player for producing bulk drugs in India, merged with large firms to maintain their presence in the market during post TRIPs period.[3]

Table-II.1
Export and Import of Bulk Drugs (Figures in Rs. Billon)

| | Pre TRIPs Period | | | | | TRIPs Period | | | | | | | | | | | | | | |
| | | | | | | Transition Period | | | | | Post TRIPs Period | | | | | | | | | |
Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export	3.07	4.68	5.97	7.99	10.25	11.11	15.62	16.11	21.21	24.54	20.92	24.18	30.42	37.70	52.66	60.48	67.10	#VALUE!	108.18	137.43	142.03
Import	7.45	11.02	9.12	11.17	12.02	11.60	12.14	14.09	19.76	21.98	21.04	28.97	36.06	44.92	53.63	60.52	70.56	#VALUE!	212.93	260.59	275.97

Source: computed from the CMIE prowess data base of 'India Trade'.

The comparative results of export and import of bulk drugs in response to the agreement of TRIPs are presented in table–II.2.

Table–II.2
Comparative Analysis of Export of Bulk Drugs
(Average value in billions)

| Indicator | Pre TRIPs Period | TRIPs period | | t-statistic# | t-statistic§ |
| | | Transition | Post TRIPs | | |
	(1995-1999)	(2000-2004)	(2005-2015)		
Export	6.42	17.95	68.11	-4.79402*	-2.4203*
Import	10.16	15.91	106.52	-2.55642**	-1.96483*

Source: computed from the CMIE prowess data base of 'India Trade'

\#. Values of t-statistic are obtained under the Null Hypothesis H_0: (BEXP$_{1995-1999}$ – BEXP$_{2000 – 2004}$) =0 and alternative Hypothesis H_1: BEXP$_{1995-1999}$ ≠ BEXP$_{2000 – 2004}$.

§. Values of t-statistic are obtained under the Null Hypothesis H_0: (BEXP$_{2005-2015}$ – BEXP$_{2000-2004}$) =0 and alternative Hypothesis H_1: BEXP$_{2005-2015}$ ≠ BEXP$_{2000-2004}$.

*. Significant at 1 % level, **. Significant at 5 % level

It is evident from the above table that both export and import of bulk drugs has increased many folds during the post-TRIPs period. As average export and import of bulk drugs is Rs. 68.11 billion and Rs. 106.52 billion respectively during post-TRIPs period while average export and import of bulk drugs is Rs. 6.42 billion and Rs. 10.16 billion respectively during pre-TRIPs period. The computed value of t-statistic, exhibited in the last column of table–II.2, suggests that these differences are statistically significantly. These results reject the hypothesis that export of bulk drugs of Indian drugs and pharmaceutical industry in the post-TRIPs period is not significantly different from the export performance of pre-TRIPs period. Therefore these result shows that there is no adverse effect on the export performance of bulk drugs in post TRIPs period, rather favorable effect has been found. The table also reflects that value of import of bulk drugs is greater than the value of export of bulk drugs in both pre-TRIPs period and post-TRIPs period. This means that export of bulk drugs has been import dependent in both the period.

Result on Absolute Export of Formulations

On the basis of collected data, the year-wise computed values of absolute export and import of formulations of Indian drugs and pharmaceutical industry for the period of study (1995-2015) are exhibited in table–II-3. The result exhibited in the third row of this table shows increasing tendency of export of formulations over the entire period. This row revels that the export of formulations has increased from Rs. 15.26 billion in 1995 to Rs. 28.78 billon in 1999, Rs. 69.09 billion in 2004 and Rs. 659.60 billion in 2015. Like-wise the export, the fourth row of table exhibits increasing trend in the import of formulations over the entire period. Import of formulations has increased from Rs. 1.39 billion in 1995 to Rs. 3.17 billion in 1999, Rs. 6.29 billion in 2004 and Rs. 718.98 billion in 2015.

Table–II.3
Export and Import in Formulations (Figures in Rs. Billon)

	Pre TRIPs Period					TRIPs Period															
						Transition Period					Post TRIPs Period										
Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export	15.26	19.70	22.92	27.16	28.78	34.87	39.56	46.24	62.86	69.09	86.68	102.26	132.47	157.13	218.42	230.80	285.09	#VALUE!	518.06	629.34	659.60
Import	1.39	1.77	1.28	2.27	3.17	3.17	3.71	4.30	7.43	6.29	9.59	14.17	21.58	20.41	29.19	35.47	36.78	#VALUE!	583.07	685.10	718.98

Source: computed from the CMIE prowess data base of 'India Trade'.

The comparative results of export and import of formulations in response to the TRIPs agreement are presented in table–II.4. This Table reflects that, as compared to pre-TRIPs period, both export and import of formulations has increased significantly during the post-TRIPs period. This table depicts that the average export of formulations is Rs. 310.98 billion during post-TRIPs period while the same was very low (Rs. 22.76 billion) in the pre-TRIPs period.

Table–II.4
Comparative Analysis of Export of Formulations (Average value in billions)

Indicator	Pre TRIPs Period	TRIPs period		t-statistic[#]	t-statistic[§]
		Transition	Post TRIPs		
	(1995-2004)	(2000-2004)	(2005-2011)		
Export	22.76	50.52	301.98	-3.92243*	-2.52166*
Import	1.97	4.98	215.43	-3.41485*	-1.48802*

Source: Computed from the CMIE prowess data base of 'India Trade'.

#. Values of t-statistic are obtained under the Null Hypothesis H_0: (FEXP$_{1995-1999}$ – FEXP$_{2000-2004}$) =0 and alternative Hypothesis H_1: FEXP$_{1995-1999}$ ≠ FEXP$_{2000-2004}$.

§. #. Values of t-statistic are obtained under the Null Hypothesis H_0: (FEXP$_{2005-2015}$ – FEXP$_{2000-2004}$) =0 and alternative Hypothesis H_1: FEXP$_{2005-2015}$ ≠ FEXP$_{2000-2004}$.

*. Significant at 1 % level

Similar result is depicted for the average value of import of formulations. However, in both periods, value of export of formulations is found far greater than the value of import of formulations. These results reject the hypothesis that export of formulation by Indian drugs and pharmaceutical industry in the post-TRIPs period is not significantly different from the export performance of pre-TRIPs period. Therefore, these results show that there is no adverse effect on the export of formulations of Indian pharmaceutical industry in post TRIPs period, rather favorable effect has been found.

Result on Share of Export of Bulk Drugs

The computed value of year-wise share of Export of bulk drugs in total export of pharmaceutical industry for the entire period (1995-2015) is presented in table–II.5. This table shows that, the yearly increment in the share of bulk drugs has been inconsistent. But, if we look at the two end point of the entire period, we find that share of export of bulk drugs has increased as share of export of bulk drugs has gone up to 17.55 percent in 2015 from 12.84 percent in 1995.

Table–II.5
Share of Export of Bulk Drug
(Values in percentage)

	Pre TRIPs Period					TRIPs Period															
						Transition Period					Post TRIPs Period										
Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Share of Exportt	12.84	16.54	17.97	22.07	22.70	20.39	22.58	17.48	17.66	18.43	12.59	10.79	11.42	11.42	13.87	13.60	12.05	#VALUE!	17.13	18.24	17.55

Source: computed from the CMIE prowess data base of 'India Trade'.

The comparative result of share of export of bulk drugs is exhibited in table–II.6. These results also support the above findings that the share of export of bulk drugs has declined in post-TRIPs period as compared to the pre-TRIPs period. The average value of share of export of bulk drugs has gone down to 13.86 percent in post-TRIPs period from 18.42 percent in pre-TRIPs period. The values of t-statistic exhibited in last column of this table suggest these differences are statistically significant.

Table–II-6
Comparative Analysis Share of Bulk Drugs in Total Export of Drugs
(Average value in Percentage)

Indicator	Pre TRIPs Period	TRIPs period		t-statistic[#]	t-statistic[§]
		Transition	Post TRIPs		
	(1995-1999)	(2000-2004)	(2005-2011)		
Bulk Drugs	18.42	19.31	13.86	-0.42884[*]	3.809167[*]

Source: CMIE prowess database of 'India Trade'.

\#. Values of t-statistic are obtained under the Null Hypothesis H_0: (SBULK$_{2000\text{-}2004}$ – SBULK$_{1995–1999}$) =0 and alternative Hypothesis H_1: SBULK$_{2000\text{-}2004}$ ≠ SBULK$_{1995–1999}$.

§. Values of t-statistic are obtained under the Null Hypothesis H_0: (SBULK$_{2005\text{-}2011}$ – SBULK$_{2000–2004}$) =0 and alternative Hypothesis H_1: SBULK$_{2005\text{-}2015}$ ≠ SBULK$_{2000–2004}$.

*. Significant at 1 % level

Result on Share of Export of Formulations

The computed value of year-wise share of export of formulations in total export of Indian pharmaceutical industry for the entire period (1995-2015) is exhibited in table–II.7

Table–II-7
Share of Export of Formulations in Total Export of Drugs
(Values in Percentage)

	Pre TRIPs Period					TRIPs Period															
						Transition Period					Post TRIPs Period										
Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Share	63.82	69.64	68.97	75.01	63.73	63.98	57.19	50.16	52.34	51.89	52.15	45.64	49.73	47.59	57.51	51.88	51.21	#VALUE!	82.01	83.52	81.52

Source: computed from the CMIE prowess data base of 'India Trade'.

If we look at the two end point of the entire period, we find that share of export of formulations has increased. Share of export of formulations has gone up to 81.52 percent in 2015 from 63.82 percent in 1995. But, if we look at the entire period, we find that share of export of formulations shows declining tendency during pre-TRIPs period and transition period while it shows increasing tendency during post-TRIPs period.

The comparative figures of share of export of formulations are exhibited in table–II.8. This table reflects that share of export of formulations has gone down to 55.11 percent in transition period from 68.23 percent in pre-TRIPs period. But it again has reached up to 60.28 percent in post-TRIPs period. These result also suggest that share of export of formulation has increased in post-TRIPs period. The values of t-statistic exhibited in last column of this table depicts that these differences are statistically significant.

Table–II-8
Comparative Analysis Share of Export of Formulations (Average value in Percentage)

Indicator	Pre TRIPs Period (1995-1999)	Post TRIPs period		t-statistic[#]	t-statistic[§]
		Transition (2000-2004)	Post TRIPs (2005-2015)		
Formulations	68.23	55.11	60.28	4.01381[*]	-0.70828[*]

Source: CMIE prowess database of India Trade'.

#. Values of t-statistic are obtained under the Null Hypothesis H_0: $(SFORM_{2000-2004} - SFORM_{1995-1999}) = 0$ and alternative Hypothesis H_1: $SFORM_{2000-2004} \neq SFORM_{1995-1999}$.

§. Values of t-statistic are obtained under the Null Hypothesis H_0: $(SFORM_{2005-2015} - SFORM_{2000-2004}) = 0$ and alternative Hypothesis H_1: $SFORM_{2005-2015} \neq SFORM_{2000-2004}$.

*. 1% level of significance.

Conclusion

Result on the absolute values of export reflect that there is no adverse effect on the export performance of the industry after the implementation of TRIPs agreement, rather it has increased significantly during the post-TRIPs period. Reasons for this finding lies in the fact that prices of drugs produced by Indian companies are cheaper in the world. And also the phenomenal growth in export performance of Indian companies during the post-TRIPs period may lies in the fact that after 2005, the patent of about top 25 drugs has expired. Due to cost advantage of Indian companies in reverse-engineering process, it was the opportunity to export more generics. However result on share of export exhibits that share of export of pharmaceutical industry has decline after the implementation of the agreement of TRIPs. This result shows the adverse effect on the export performance of pharmaceutical industry after the implementation of TRIPs agreement.

Findings of product level analysis reflect that, annual as well as average value of export of both the products (i.e. bulk drugs and formulations) has

increased in post-TRIPs period. But, in relative term, export of bulk drugs was found declining while export of formulations was found increasing in post-TRIPs period. It was also found that share of formulations in total export of the industry has increased whereas share of bulk drugs in total export has decreased in post-TRIPs period. These findings, therefore, reflect that composition of India's drugs & pharmaceutical export has shifted in favour of formulations in post-TRIPs period.

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Footnotes

1. This Paper is a part of UGC Funded Major Research Project entitled "A Study of the Effects of TRIPs Agreement on Indian Drugs and Pharmaceutical Industry" conducting in the Department of Economics, DDU Gorakhpur University, Gorakhpur.
2. Joseph, K. Reji (2011).
3. Rao, J. Mnohar (2007).