

Market Assessment of Natural Surfactant
(ALVEOFACT) in Varanasi, Azamgarh, Allahabad,
Gorakhpur, (Uttar Pradesh)

By

Tanjay Kumar

*Dissertation submitted for the partial fulfillment of the
MBA Pharmaceutical Management*

Academic year, 2017-2019



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TO WHOMSOEVER MAY CONCERN

This is to certify that **Mr. Tanjay Kumar**, student of **MBA Pharmaceutical Management** from The IIHMR University, Jaipur has undergone internship/dissertation training at ***Bharat Serums & Vaccines Pvt. Ltd.*** from **18th Feb 2019** to **12th May 2019**.

The Candidate has successfully carried out the study assigned to him during internship/dissertation training and his approach to the study has been sincere, scientific and analytical.

The Internship/dissertation is in fulfillment of the course requirements.

I wish him all success in all his future endeavors.



Dr. Sandeep Narula
Dean,
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The IIHMR University, Jaipur



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The certificate is awarded to

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Allahabad, and Gorakhpur, (Uttar Pradesh)”**

Date 12th May 2019

Bharat Serums and Vaccines Pvt. Ltd.

He comes across as a committed, sincere & diligent person who has a strong
drive and zeal for learning

We wish him all the best for future endeavors.

For Bharat Serums and Vaccines Limited,

Akhilesh Mishra

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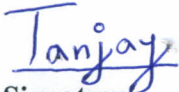
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Signature

Acknowledgement

I humbly owe the completion of this dissertation work to the almighty and my family whose love and blessing will be with me in every movement of my life.

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Abbreviations:

BLES	Bovine Lipid Extract Surfactant
CMEs	Continuing Medical Educations
DPPC	Dipalmitoyl phosphatidyl choline
ELF	Epithelial lining fluid
HMD	Hyaline membrane disease
NRDS	Neonatal Respiratory Distress Syndrome
PC	Phosphatidyl choline
PIE	Pulmonary interstitial emphysema
PG	Phosphatidyl Glycerol
RDS	Respiratory Distress Syndrome
RTMs	Round Table Meeting
SP-B	Surface Protein-B

Abstract

Background

The aim of the study is “Market Assessment of Natural Surfactant (Alveofact) in Varanasi, Azamgarh, Allahabad, and Gorakhpur (Uttar Pradesh)”. The research work on Alveofact for the treatment of neonatal respiratory distress syndrome (NRDS) was carried out in cities of Uttar Pradesh with respect to the survey with neonatologist and pediatricians’ doctors, stockists and hospital pharmacies. In terms of availability, and market awareness of surfactants, the result obtained from various surfactant brand have different market strength.

Objective

- To know the most selling natural surfactant brands in Cities of Uttar Pradesh.
- To know the competitive scenario of Alveofact.
- To know the doctors’ attitude towards Natural Surfactant.

Methodology

1. Study Design

Descriptive Study was performed to get market insights.

2. Sample size

100 doctors and 100 chemists in Cities of Uttar Pradesh

3. Sampling Method

Non-probability sampling

4. Method of data collection

Based on nature of study, I have collected two types of data viz, primary and secondary data. Primary data was collected through questionnaire and secondary data was collected by browsing on internet and various articles.

5. Duration of Study

18th Feb to 12th May 2019

Result

From the data analysis most of the doctors given a response on MOA video, and scientific leave behind literature in prescribing the natural surfactant. Doctors preferred lyophilized prefilled syringe form (Survanta) to Alveofact. By retailer survey data, most of the selling surfactant in Mumbai is Survanta.

Conclusion

Almost all the neonatologist preferred surfactant for treating the NRDS patients. Natural surfactant has shown to have a better prognosis than synthetic surfactants. The intraventricular haemorrhage, pneumothorax and rate of bronchopulmonary dysplasia were similar among patients treated with Alveofact, Curosurf and Survanta. The doctors preferred brand for the treatment of neonatal respiratory distress syndrome in preterm baby is Survanta (Abbott) because of well-established surfactant brand for the treatment of NRDS patients and high margin on Survanta in hospital pharmacy.

Key words

NRDS, BLES, CMEs, RTM, ELF, BSV, PC, PE, PG, PIE, ELF, DPPC, HMD

Executive Summary

Due to an increase in competition within the market, everybody needs to understand their existence within the market against alternative competitors that are within the same trade. So, it's terribly essential to understand the contestant market potential of a selected product like (Natural surfactant) and once then it's vital to understand the opposite chance to focus on the potential market consistent with their want, assess all the selling strategic by seeing past relevant information of alternative contestant productlike (Survanta) in this targeted market and so accompany some purpose of distinction in their own product to capture that competitor target market.

The aim of the study is “Market Assessment of Natural Surfactant (Alveofact) in Varanasi, Azamgarh, Allahabad, and Gorakhpur (Uttar Pradesh)”. I have done a research work on Alveofact for treatment of Neonate respiratory distress syndrome (NRDS). From doctors to distributor to retailers each of them has a role to play. Just by focusing on the Neonatologist doctors to prescribe a product won't help. as even retailers and distributors should have that product to sell it to the patient and hospitals respectively. The study was carried out in Selected Cities of Uttar Pradesh, with respect to the survey with Neonatologist& Pediatricians doctors, stockists and hospital pharmacies.

The project was started on 18thFebruary 2019 after getting all the information regarding the project. I have collected two types of data viz, primary and secondary data. Primary data was collected through questionnaire and secondary data was collected by browsing on internet and various articles. The data was collected from the survey with the help of questionnaire by visiting the doctors and chemist stores. Result and finding was carried out to draw conclusion. The project was completed on 12th May 2019.

From the study it was found that Survanta is majorly prescribed Natural surfactant for the treatment of Neonate respiratory distress syndrome (NRDS) because of ease to use, and well establish brand in market.

NATURAL SURFACTANT

- INTRODUCTION

Pulmonary surfactant is a lipid-protein complex that is synthesized and stored in type II alveolar epithelial cells as lamellar bodies. Once secreted into the epithelial lining fluid (ELF), a small fraction of surfactant is rapidly adsorbed in the space between the alveolar air and the surface of the ELF. This reduces surface forces during end-expiration and maintains variably low surface tension during the respiratory cycle. After birth, premature neonates born with immature lungs may develop NRDS. This is mainly because an inadequate amount of surfactant is secreted into the ELF because of the immaturity of the type II alveolar cells.

- ACTION OF SURFACTANT

Surfactant prevents atelectasis and oedema, by decreasing interfacial surface tension. Thus, its role is instrumental in maintaining gas exchange and decreasing the work of breathing. Furthermore, surfactant serves as a lubricant in protecting the airways and promoting mucociliary transport.

The need for supplementary oxygen and mechanical ventilation decreases in patients receiving surfactant. Furthermore, the incidence of pneumothorax and pulmonary interstitial emphysema (PIE) is decreased by 50-80%. Analysis of all randomized trials indicates that surfactant supplementation decreases neonatal mortality by about 33% and increases survival without chronic lung disease by about 17%. Surfactant therapy has become a routine treatment for neonates with severe NRDS. Some clinicians advocate prophylactic surfactant at birth for small neonates born at less than 30 weeks of gestation, who are at high risk of developing NRDS.

- MECHANISM OF ACTION

Surfactant reduces surface tension at the interface between the alveolar air and the membrane.

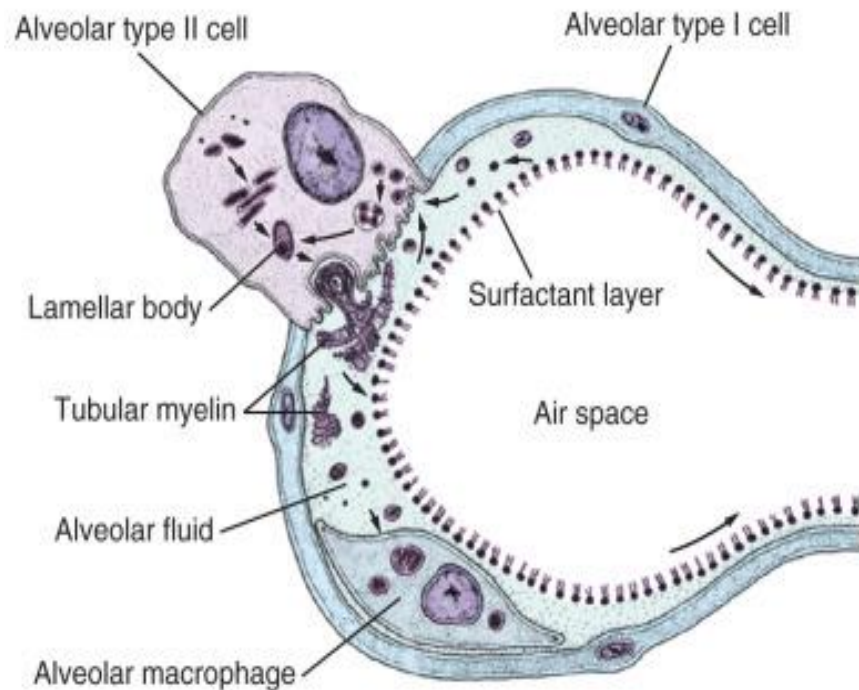


Fig. 1: Alveolus lined with surfactant

Surfactant molecules are amphipathic. They have a hydrophilic head (water loving) and a hydrophobic (water-hating) tail. The most energetically favorable conformation for them is to lie with the hydrophilic head immersed in water and the hydrophobic tails safely removed from water, exposed to air. Surfactant molecules adsorb at the air fluid interface and reduce the surface tension. Thus, surfactant prevents atelectasis and oedema, improves gas exchange and decreases the work of breathing.

- COMPONENTS OF SURFACTANT

It consists of lipids and proteins.

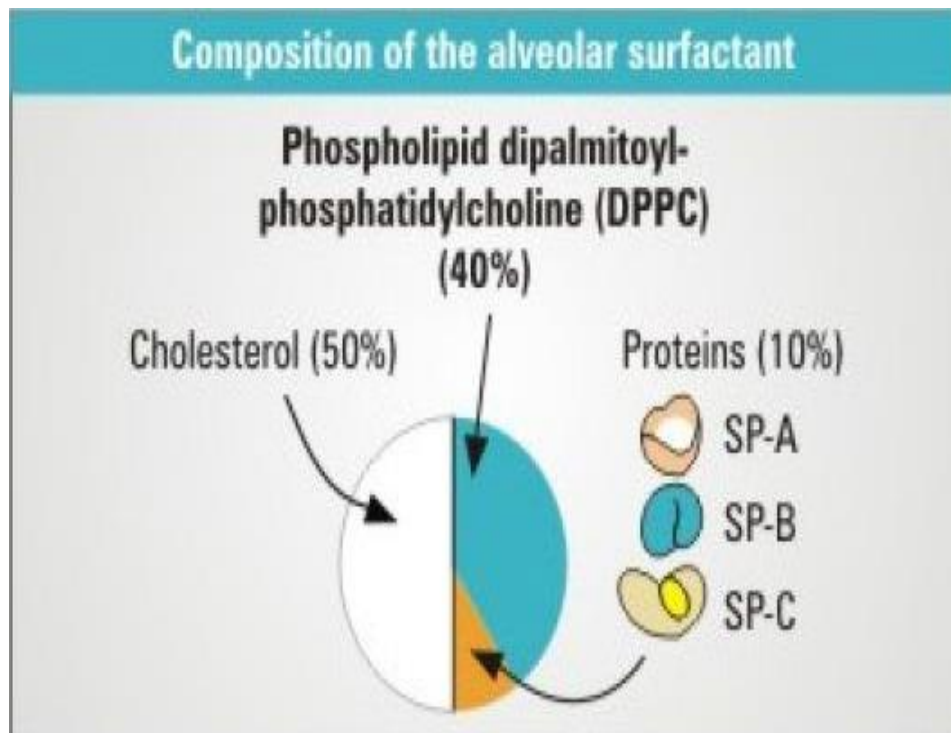


Fig 2: Components of alveolar Surfactant.

- EXOGENOUS SURFACTANTS

In case of surfactant deficiency as seen in neonates, particularly those born prematurely, surfactant supplementation becomes necessary. The desirable properties of any exogenous surfactant are efficacy and safety. Others include minimal immunogenicity, minimal batch to batch variability, good resistance against biodegradation and availability at reasonable cost.

- **TYPES OF EXOGENOUS SURFACTANTS**

- 1. Natural Surfactant**

Animal-derived lung lipid extracts, or lung lavage extracts from porcine or bovine lungs are naturally occurring surfactants.

- 2. Modified natural surfactants**

Modified natural surfactants are essentially lung lipid extracts supplemented with phospholipid or other components.

- 3. Human Surfactant**

Human surfactant is isolated from amniotic fluid from full-term foetuses.

- 4. Synthetic Surfactant**

These do not contain proteins. Synthetic surfactants containing recombinant proteins or synthetic peptides are yet to be evaluated clinically.

- **PHARMACOKINETIC PROFILE**

Endogenous and exogenous surfactants have similar clearance and catabolic pathways in the ELF. Within the ELF, the surfactant undergoes transition from a large aggregate form (lamellar bodies and tubular myelin) to a smaller vesicular form that has no surface activity and that is cleared from the ELF. Type II alveolar cells are a major site for the clearance and catabolism of

surfactant. Only small quantities of exogenous and endogenous surfactant (3-7%) are cleared by the airways and some surfactant (10-30%) is taken up by alveolar macrophages.

In Type II cells, some exogenous surfactant is incorporated in lamellar bodies and secreted back to the ELF as intact molecules (recycling). Administration of surfactant into the airways is associated with the following phenomena. First, there is rapid distribution of exogenous surfactant throughout patent airways and airspaces. During the next 1 to 2 hours, the amount of exogenous surfactant that can be lavage from the airways decreases rapidly, because the surfactant complex is associated with lung parenchyma. Thereafter, surfactant flux from the ELF to the lung parenchyma continues at a rapid rate. However, the epithelial uptake of surfactant is balanced by surfactant secretion into the ELF.

Components of surfactant may be quantified based on a reference compound, such as sphingomyelin or protein. The most frequently used index is the saturated phosphatidylcholine to sphingomyelin (L/S) ratio.

Surfactant Synthesis and Secretion

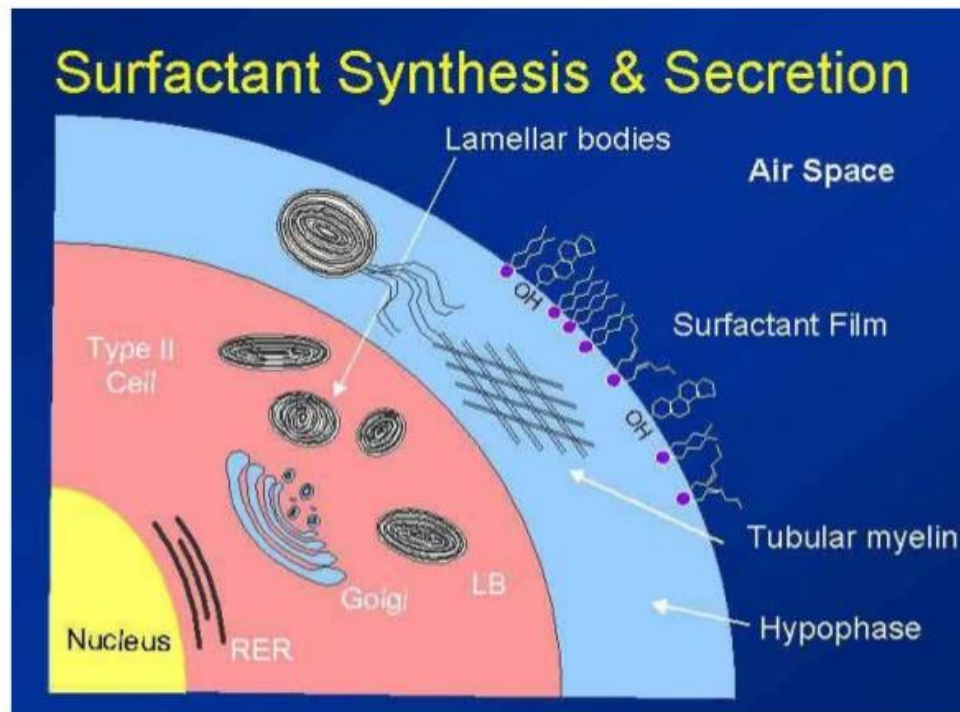


Fig. 3: Synthesis and secretion of Surfactant.

NEONATAL RESPIRATORY DISTRESS SYNDROME

- DEFINITION

Neonatal respiratory distress syndrome (NRDS), also known as hyaline membrane disease (HMD), is a condition of increasing respiratory distress, commencing at or shortly after birth and increasing in severity until progressive resolution occurs among the survivors, usually between the second and fourth day. About 1% of all newborn infants are affected with this condition. It is due, at least in part, to insufficiency of pulmonary surfactant and is mainly confined to preterm infants.

- DIAGNOSIS

NRDS is manifested by respiratory distress (cyanosis, tachypnoea, grunting, and recession) and respiratory failure is diagnosed by blood gas analysis. oedema is frequently seen on the second day due to fluid retention and capillary leak.

The diagnosis can be confirmed by an X-ray showing ground glass appearance (Fig. 4) and air bronchograms, although these radiological features are not pathognomic of NRDS.

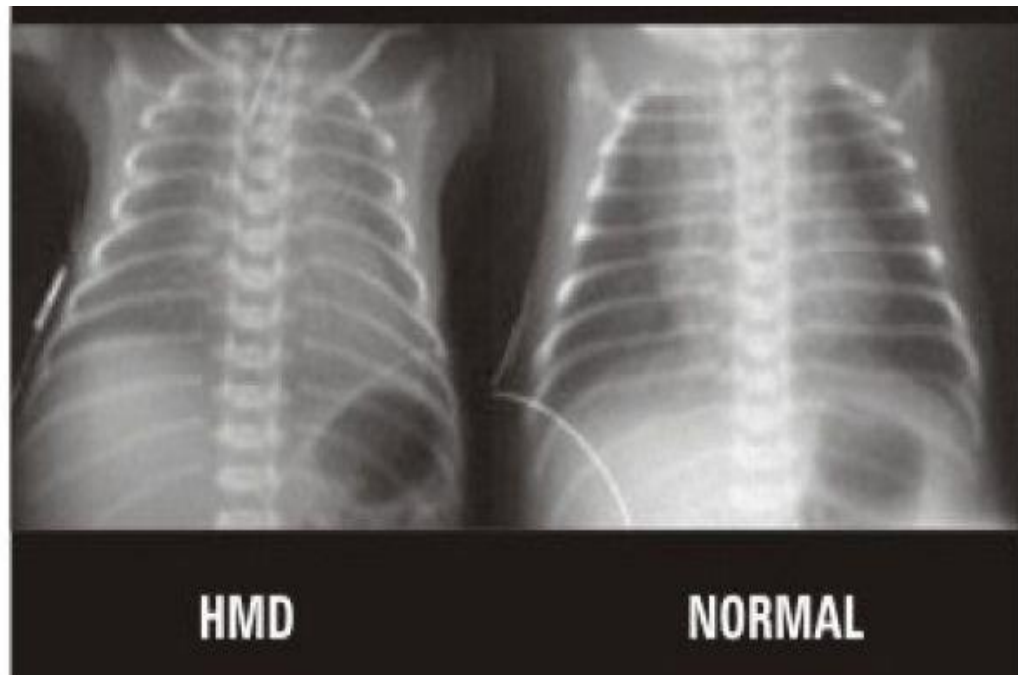


Fig. 4: Chest Radiograph of a neonate with Hyaline Membrane Diseases.

- **AETIOLOGY**

Surfactant deficiency at birth is the main precipitating factor for RDS. Endogenous surfactant produced in the lungs reduces the surface tension in these microscopic air sacs, preventing their collapse. The foetus does not start to produce surfactant until 22-23 weeks gestation. By 32-33 weeks, most babies have enough endogenous surfactant. Babies born prematurely, with insufficient endogenous surfactant are at risk of developing NRDS as they try to breathe. Damage to lung tissue produces HMD. Subsequent reduction of oxygen in the blood, or the application of high-pressure ventilation may produce other complications. Antenatal steroids can accelerate lung development and hence surfactant production but cannot prevent all NRDS.

Multiple other developmental and physiological maladaptive factors interact with the surfactant-deficient lung to produce the clinical syndrome of RDS. Successful adaptation of the fluid-filled foetal lungs at birth depends on the transpulmonary pressure gradient generated by the respiratory muscles, the physical properties of the foetal lung fluid, the structure of the air-blood barrier, and the perfusion of the lungs.

- PATHOGENESIS AND PATHOLOGY

1. High surface tension of foetal lung fluid, self-deflating chest cage, and poor respiratory drive lead to failure in aeration of the lungs.
2. Furthermore, structural immaturity of the lungs causes a leakage of plasma proteins into airspaces and susceptibility to rupture of the lungs.
3. Abnormal perfusion of the pulmonary vasculature and maldistribution of ventilation and perfusion with frequent extrapulmonary shunting of the blood further deteriorates the gas exchange.
4. As a result of lung immaturity and the intensive therapy aimed at improving lung function, a multitude of factors increase the susceptibility of the lungs to injury. These include immaturity of the host defence systems, infections, barotraumas, and hyperoxia.
5. Pathological hallmarks of NRDS include poor and frequently uneven aeration of the alveoli and airspaces, and hyaline membranes composed of serum-derived proteins (notably fibrin), cell debris, and inactivated surfactant.

- PREVENTION AND TREATMENT

NRDS is a self-limiting developmental disease that is preventable when premature delivery is postponed or when acceleration of foetal lung maturity is achieved by maternal therapies (e.g. Glucocorticoids). Unfortunately, therapies aimed at prevention of NRDS are frequently not effective. But, supplementary oxygen, ventilation with continuous distending pressure and surfactant supplementation are single therapies that have advanced the treatment of NRDS remarkably during the past 30 years.

ALVEOFACT

➤ INTRODUCTION AND BRIEF HISTORY

Alveofact is a natural surfactant developed in Germany by Lyomark Pharma. It is known as BLES (Bovine Lipid Extract Surfactant) in Germany and developed by Lyomark pharma.

It is natural surfactant derived from bovine lungs by lavage extraction. It contains numerous phospholipids with dipalmitoyl phosphatidyl choline (DPPC) being most abundant. It also includes hydrophobic surfactant associated proteins, SP-B and SP-C, which facilitate dispersion of phospholipids. When administered intratracheally, Alveofact is rapidly adsorbed forming an active phospholipid monolayer at air-fluid interface.

Original formulation of BLES was with 45 mg of phospholipids/ml. At the time of Phase III trial with BLES (Alveofact).

The safety and efficacy of Alveofact is supported by this comparative phase III trial. The dose of 45 mg/kg of phospholipids can cover the entire lung surface. But there is evidence to suggest that there is dose dependent improvement in response to surfactant therapy. Also, a generous dose aids not only in making up for the deficit in preterm neonate's lung but also compensates for uneven distribution and inactivation by plasma proteins in alveolar space. It also aids in fueling metabolic pathways for recycling.

The current formulation of BLES/ Alveofact (45mg/ml) when compared to original formulation (45 mg/ml) was shown to pose no greater risk of adverse events than original formulation.

➤ MANUFACTURING&QUALITY CONTROL

The manufacturing process can be divided into 2 phases: -

- Collection of bovine lung surfactant
- Purification by solvent extraction

➤ COLLECTION OF BOVINE LUNG SURFACTANT

Bovine lung lavage with saline solution is performed and surfactant foam is collected. The cows are of Germany origin.

➤ PURIFICATION BY SOLVENT EXTRACTION

Purification process involves successive extraction with solvents to remove unwanted components of lung lavage.

After series of cycles of solvent extraction using solvents like chloroform, methanol, KCL, ethanol and acetone, final solvent removal is performed overnight in vacuum system to get the drug substance, i.e. Bovine lipid extract surfactant (Alveofact).

➤ QUALITY CONTROL(QC)

QC sample is drawn prior to final dry-down of drug substance and in-process tests for phospholipids and appearance are performed.

After drug substance is compounded to finished product, other QC tests that reflect the quality of drug substance like tests for total protein content, total phospholipid content, phospholipid composition and residual organic solvents performed.

Biophysical activity of the drug is measured using pulsating bubble surfactometry.

Cellular contaminants present in the source are removed during steps to precipitate and remove hydrophilic proteins. Protection of product, environmental control of air and use of aseptic technique minimize potential for contamination of product during processing. The product is then terminally Sterilized.

➤ DIFFERENTIALS

1. Alveofact is a natural surfactant obtained by lung lavage and has a composition of phospholipids like endogenous surfactant. The other commercially available surfactants (Bovine minced lung extract surfactant and Porcine minced lung extract surfactant) are obtained by mincing. Mincing adds to cellular components to extract thus, making it more viscous and reduces concentration of SP-B&SP-C.
2. Alveofact contains higher concentration of surfactant protein SP-B &SP-C. Surfactant proteins SP-B and SP-C aid in rapid adsorption of surfactant to alveolar surface thereby promoting rapid action. Also, they resist inactivation of surfactant in alveolar space by plasma proteins.
3. Alveofact is now available all over India even in remote areas.
4. Alveofact is 8 times less viscous than Bovine minced lung extract surfactant aiding in rapid peripheral distribution.
5. Availability in vials of 1.2ml, makes Alveofact a cost-effective choice.

Literature Review

1. According to author **Coen HMP Willems, Florian Urlichs, Silvia Seidenspinner, Steffen Kunzmann, Christian P Speer, Boris W Kramer** state that, the porcine extracted lung surfactant (poractant alfa) enriched the phagocytosis of apoptotic neutrophils by alveolar macrophages which leads to anti-inflammatory properties.
2. **According to author WOLFGANG BERNHARD, JASMIN MOTTAGHIAN, ANDREAS GEBERT, GUNNAR A. RAU, HORST von der HARDT and CHRISTIAN F. POETS,** the surface tension lowering properties of natural surfactants (Curosurf, Alveofact) is equivalent to native surfactant whereas the semisynthetic surfactants (Survanta, Exosurf) were unqualified to indicate surface tension lowering property as compared to native surfactant.
3. According to author **Mirhadi Mussavi, Keyvan Mirnia, and Khairollah Asadollahi**, in the Alveofact group, the new cases of pneumothorax was impressively higher, the mean hospital-stay length, mean ventilation time and the new cases of PDA were also impressively higher in the Alveofact group.
4. According to author **HansProquitte, Thekla Dushe, Hannes Hammer, Mario Rudiger, Gerd Schmalisch, Roland Wauer**, there is no significant difference between Alveofact and Curosurf for treating the NRDS patients.
5. According to author **Seeger, C. Grube*, A. Günther, R. Schmidt**, the surface tension lowering properties of the natural surfactant Curosurf and Alveofact meet mainly accepted standard of satisfying surfactant function.

Research Problem

- Respiratory Distress Syndrome (RDS) is observed in premature infants (<37weeks). Surfactants production is insufficient due to the immature development of type II Pneumocytes, which begin to be produced Surfactant at approximately 22-23 weeks gestation. Insufficient surfactant leads to reduced pulmonary compliance and increased surface tension. It is due, to insufficiency of pulmonary surfactant and is mainly confined to preterm infants. Poor Oxygen supply to the body due to damage of Lungs (Alveoli). Which result to increase the Mortality rate, Infections and Permanent Neurodevelopment Handicap. So, with the help of this study we can find out the market potential of Natural surfactant in selected cities of Uttar Pradesh.

Objectives

- To find out most selling Natural surfactant brands in selected Cities, Uttar Pradesh.
- To find out most selling Natural surfactant dosage strength in selected cities, Uttar Pradesh.
- To find out the Dose per Kg required of Natural Surfactant in selected cities, Uttar Pradesh.

Research Methodology

- **Study Design:** - Descriptive Study
- **Sampling:** - Non-Probability (convenience Sampling).
- **Target Respondent:** - From various Govt. & Private hospitals, Neonatologists and Pediatricians.
- **Sample area:** - Varanasi, Azamgarh, Allahabad, and Gorakhpur, (Uttar Pradesh)
- **Tools Used for Data Collection:** Direct Questionnaire method
- **Type of Questionnaire:** Semi-Structured
- **Type of Questions:** closed and open ended.

Research plan

- **Data Source:** - Primary data (Through Questionnaires and meeting with respondents and Secondary data (Through Company website, various research articles and publications). Data was triangulated using both Primary and Secondary approach.
- **Data Collection Type:** - Qualitative and Quantitative.
- **Sample size:** - No. of Doctors:100.
No of Chemists:100.
- **Duration of Study:** - 3 months.
- **Data Analysis Techniques:** - The findings and the information's collected and compiled, analyzed on Microsoft Excel.

Data Analysis of Doctors Responses.

1. Doctor in which indication do you Preferred Natural Surfactant.?

Indications	No. of Responses
Bronchopulmonary Dysplasia	12
Air Leak	0
Pulmonary Haemorrhage	0
RDS	68
Lung Infection	6
Breathing Problem	11
Others (Genetic Disorders)	3

Table 1: Indications.

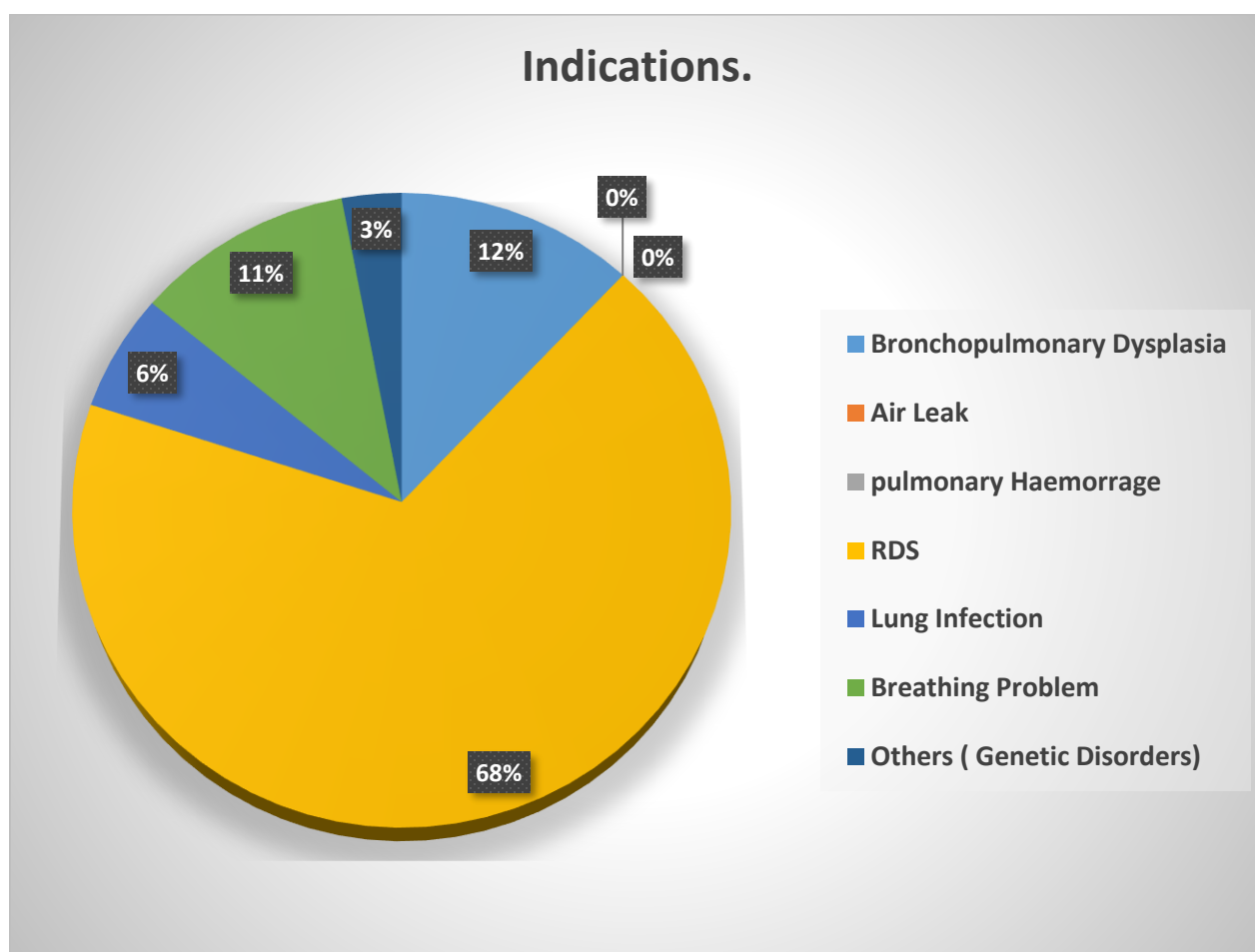


Figure 5: Indications.

Interpretation: -

- It was found out that 68% of the doctors prescribes natural surfactant to treat the RDS.

2. Doctor what is the preferred dosage for 1kg Baby in RDS Cases.?

Dosage	No. of Responses
1.2 ml	6
1.5 ml	9
4 ml	68
5 ml	17

Table 2: Dosage Required per Kg.

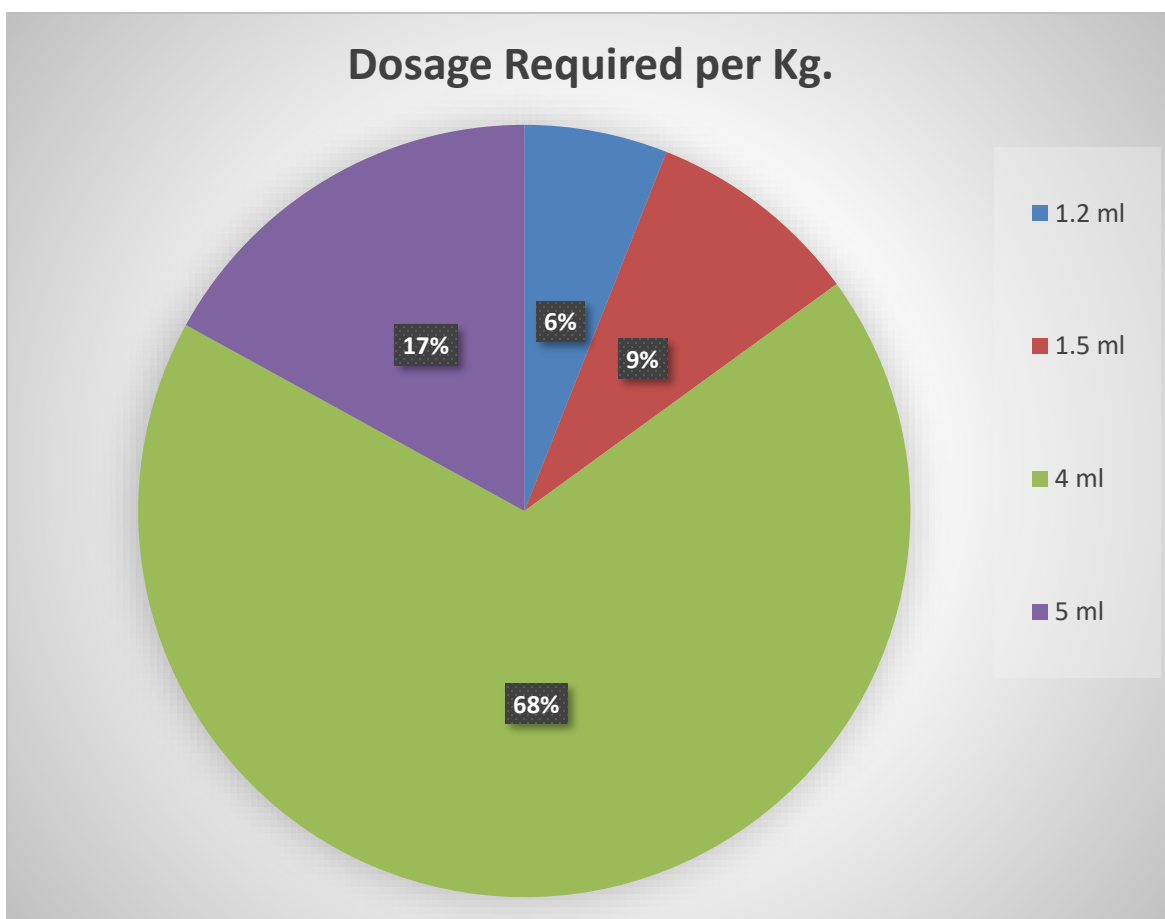


Figure 6: Dosage Required per Kg.

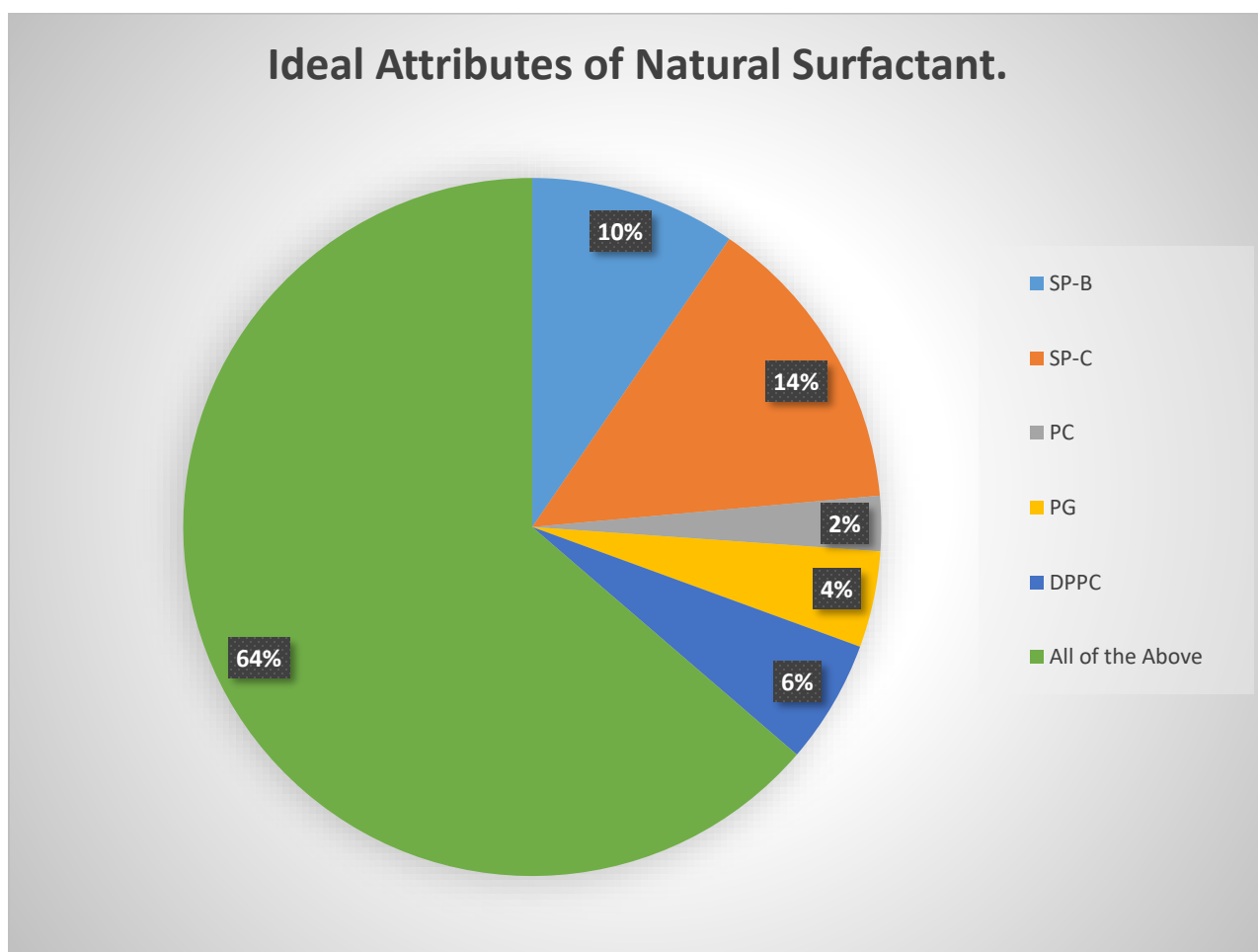
Interpretations: -

- It was found out that 68% of the doctors preferred 4ml per Kg dose in the treatment of RDS cases.

3. Doctor according to you, what are the attributes of ideal Natural Surfactant.?

Ideal Attributes	No. of Responses
SP-B	15
SP-C	22
PC	4
PG	7
DPPC	9
All the Above	100

Table 3: Ideal Attributes of Natural Surfactant.



Figures 7: Ideal Attributes of Natural Surfactant.

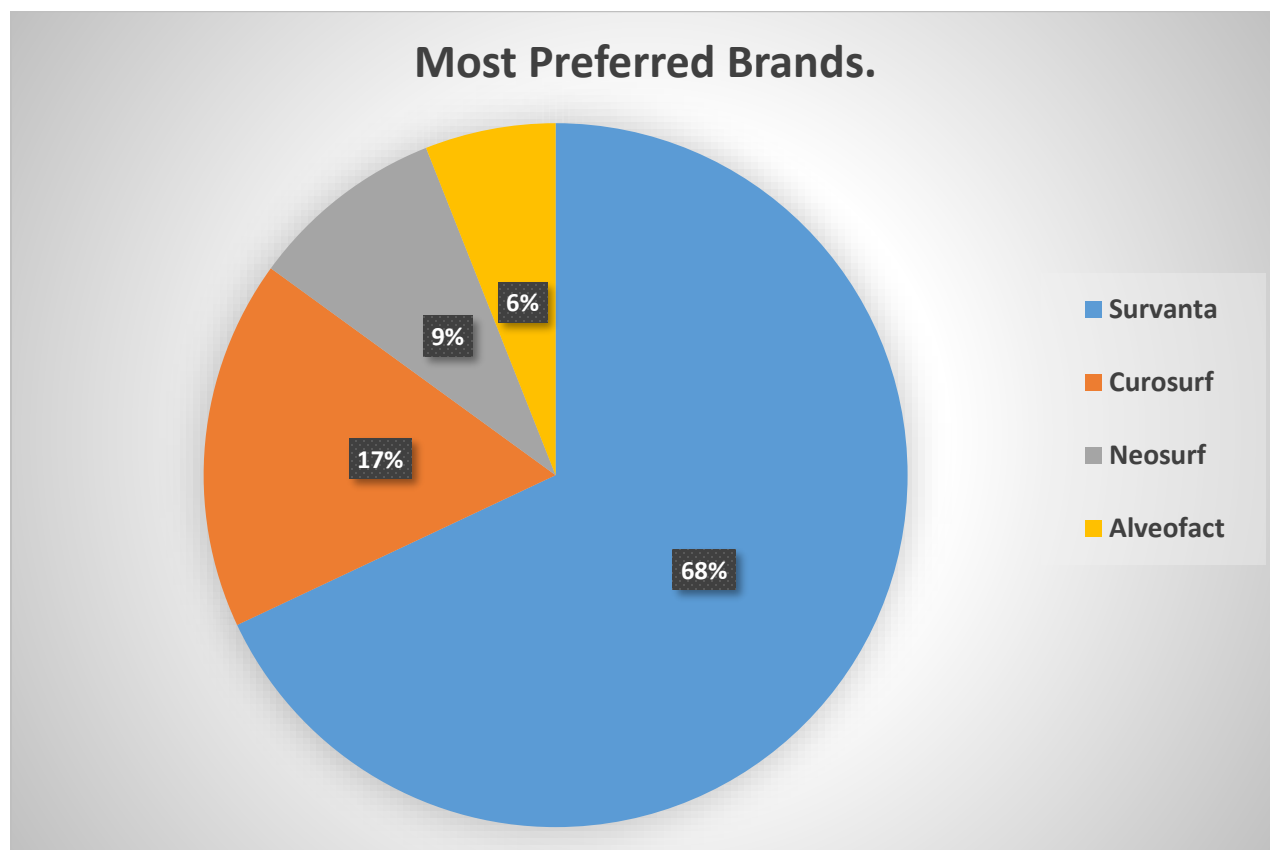
Interpretation: -

- It was observed that 64% of the doctors preferred all the attributes of the Natural Surfactant, i.e. mentioned SP-B, SP-C, PC, PG, DPPC, and only 36% of the doctors preferred SP-B, SP-C, PC, PG, DPPC these attributes individually.

4. Which brands do you use the most in the treatment of RDS or breathing problem associated with other indications.?

Most Preferred Brands	No. of Responses
Survanta	68
Curosurf	17
Neosurf	9
Alveofact	6

Table 4: Most Preferred Brands.



Figures 8: Most Preferred Brands.

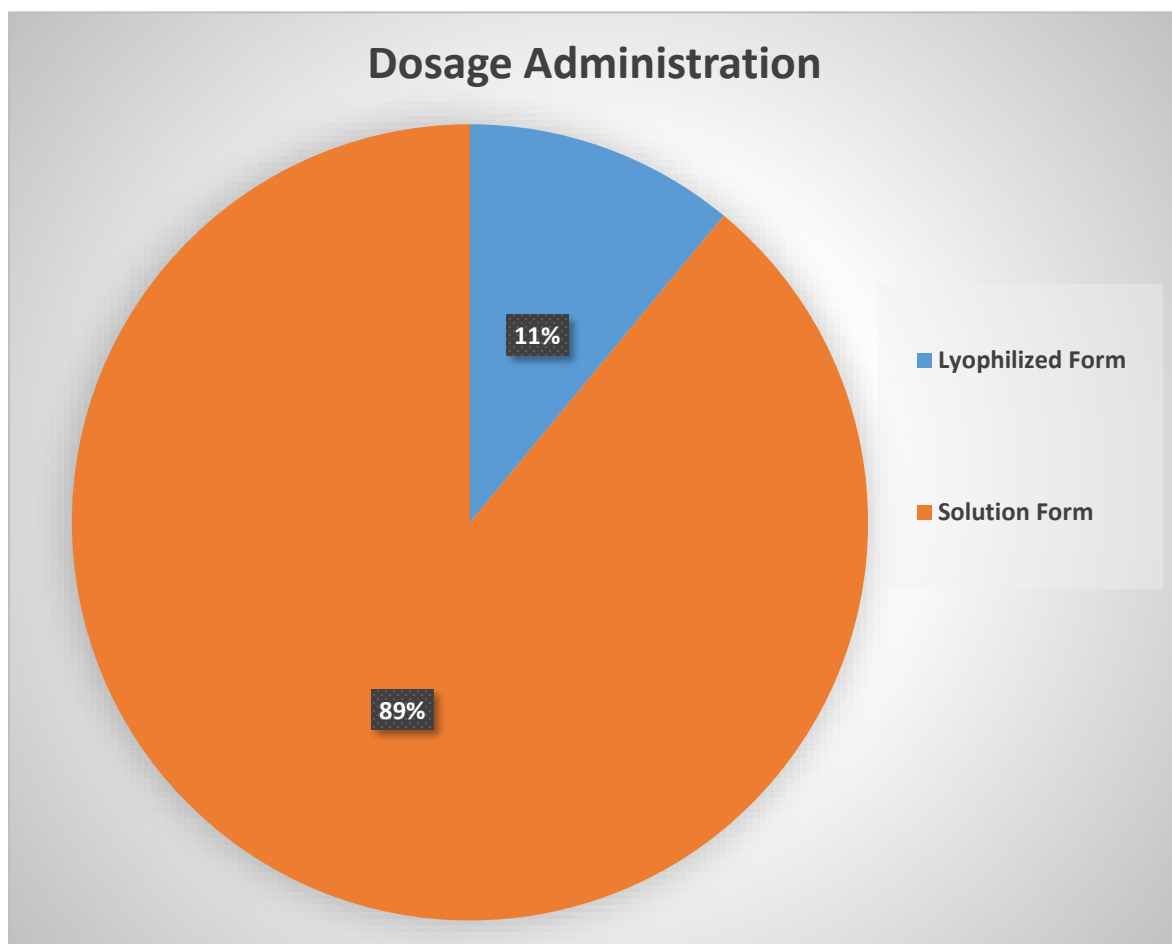
Interpretations: -

- It was found out that 68% of the doctors go with Survanta for treating the RDS patients.

5. Doctors which is the most accepted form of administration by patients.?

Dose Forms	No. of Responses
Lyophilized Form	11
Solution Form	89

Table 5: Dose Forms.



Figures 9: Dose Administration Forms

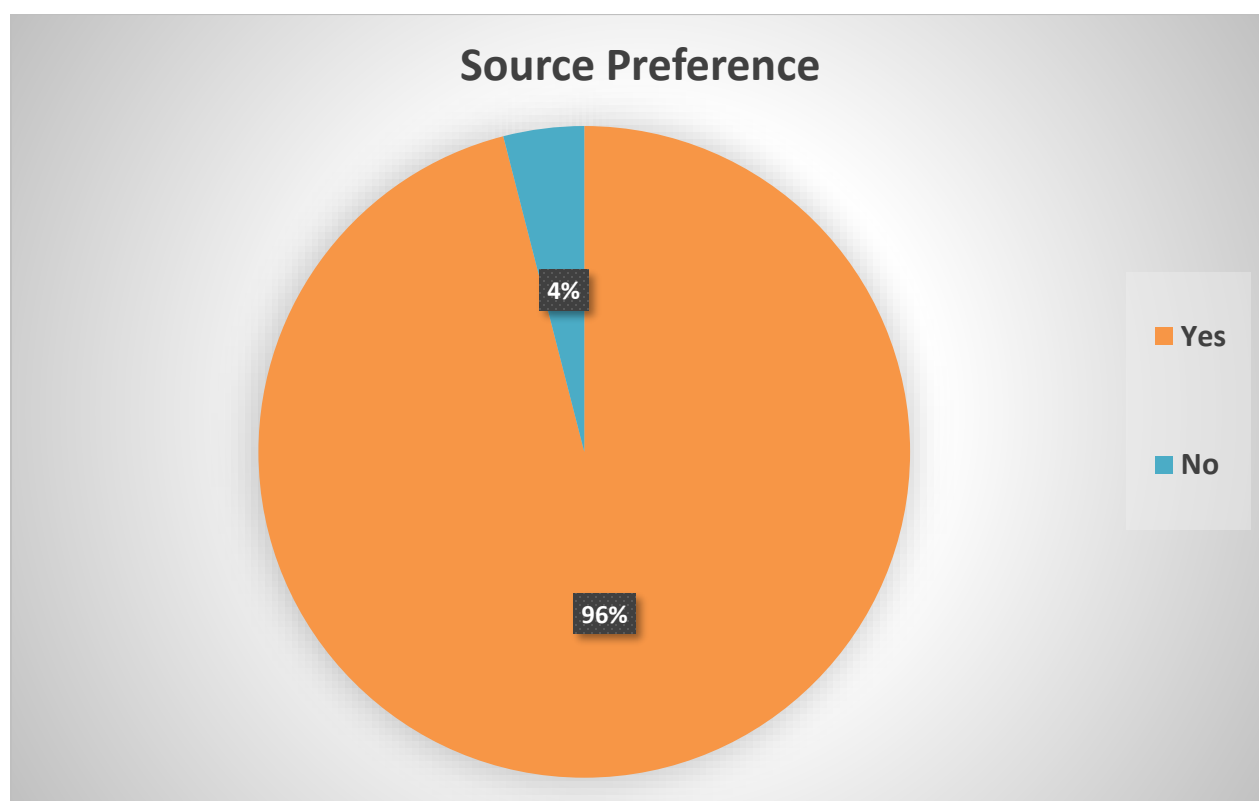
Interpretation: -

- It was observed that 89% of the doctors go with Solution form of Natural Surfactant to administration in the RDS patients and only 11% doctors go with Lyophilized form.

6. Doctors do you think Bovine based Natural Surfactant is an effective than Porcine Based.?

Effective Source	No. of Responses
Yes	96
No	4

Table 6: Effective source Preference.



Figures 10: Effective source Preference.

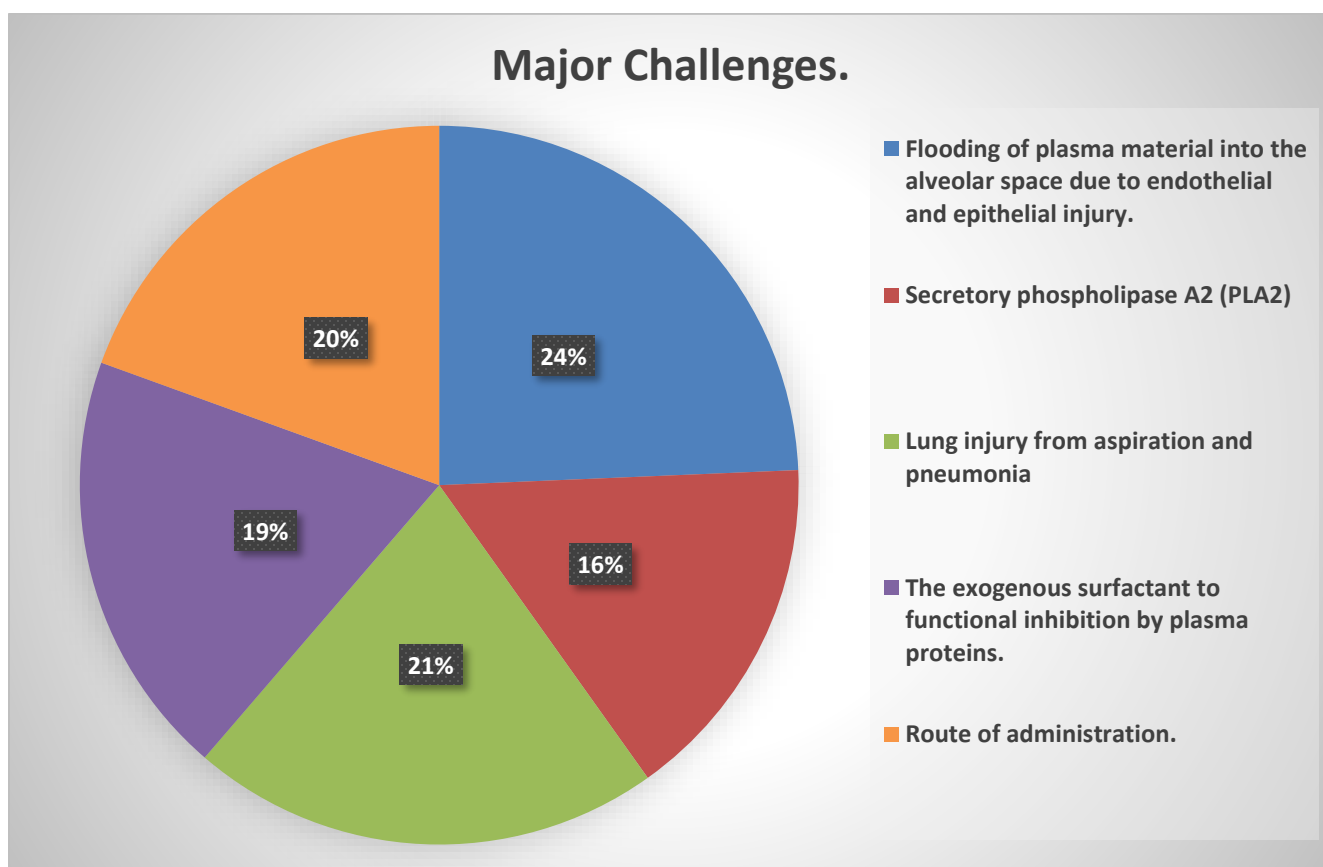
Interpretation: -

- It was found out that 96% of the doctors agreed with that bovine based Natural surfactant is an effective than porcine based, only 4% of the doctors agreed that porcine based natural surfactant is an than bovine based.

7. Doctors what are the challenges you faced in the treatment of RDS at patient level.?

Major Challenges	No. of Responses
Flooding of plasma material into the alveolar space due to endothelial and epithelial injury.	100
Reactive oxygen species	0
Secretory phospholipase A ₂ (PLA ₂)	65
Lung injury from aspiration and pneumonia	87
The exogenous surfactant to functional inhibition by plasma proteins.	79
Route of administration.	80

Table 7: Major Challenges.



Figures 11: Major Challenges.

Interpretation: -

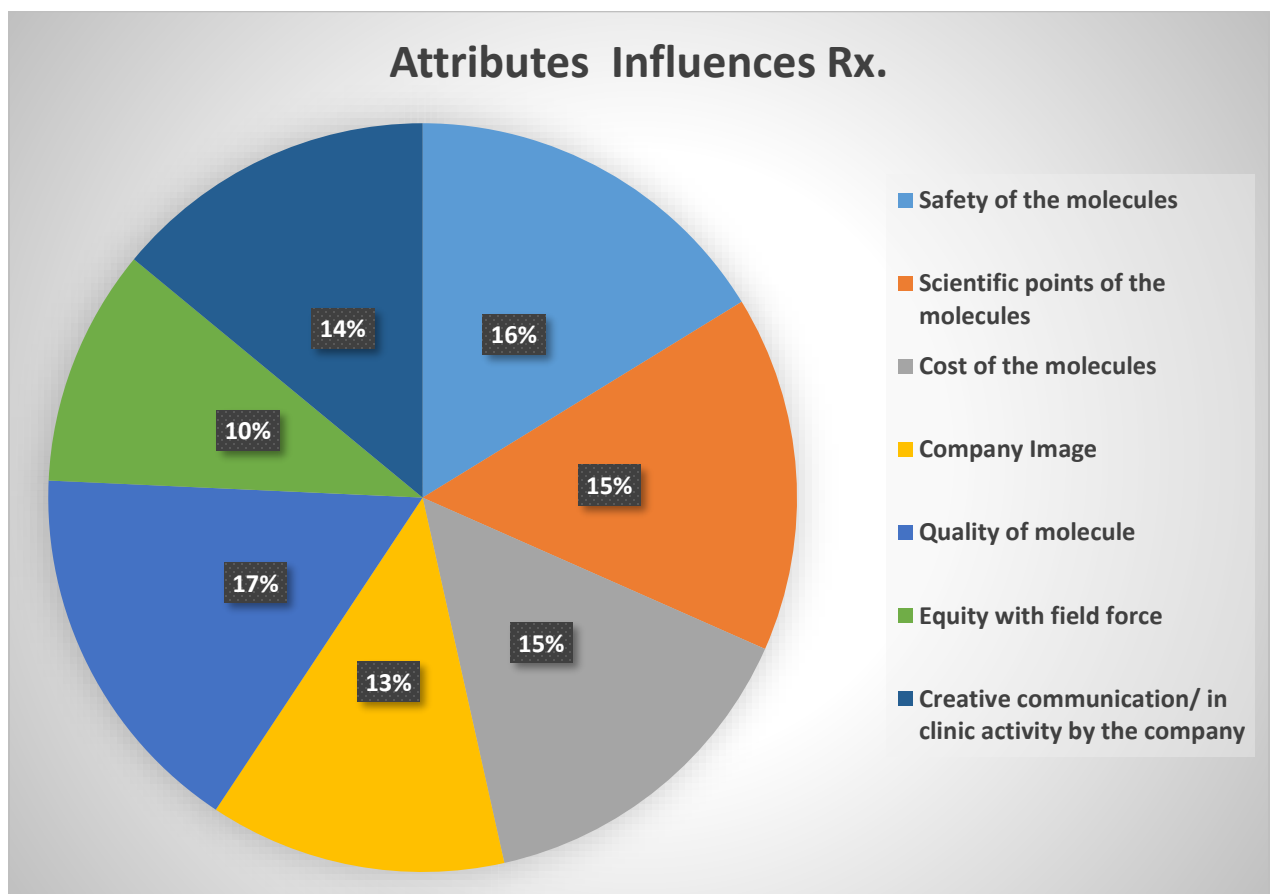
It was observed that the major challenges faced by the doctors at the patient's level in the treatment of RDS patient's i.e. 24% Flooding of plasma material into the alveolar space due

to endothelial and epithelial injury, 21% Lung injury from aspiration and pneumonia, and 20% Route of administration.

8. Doctor which of the following attributes influences your Rx.?

Influences Attributes	No. of Responses
Safety of the molecules	95
Scientific points of the molecules	90
Cost of the molecules	87
Company Image	75
Quality of molecule	96
Equity with field force	60
Creative communication/ in clinic activity by the company	82

Table 8: Attributes influences for prescription.



Figures 12: Attributes influences for prescriptions.

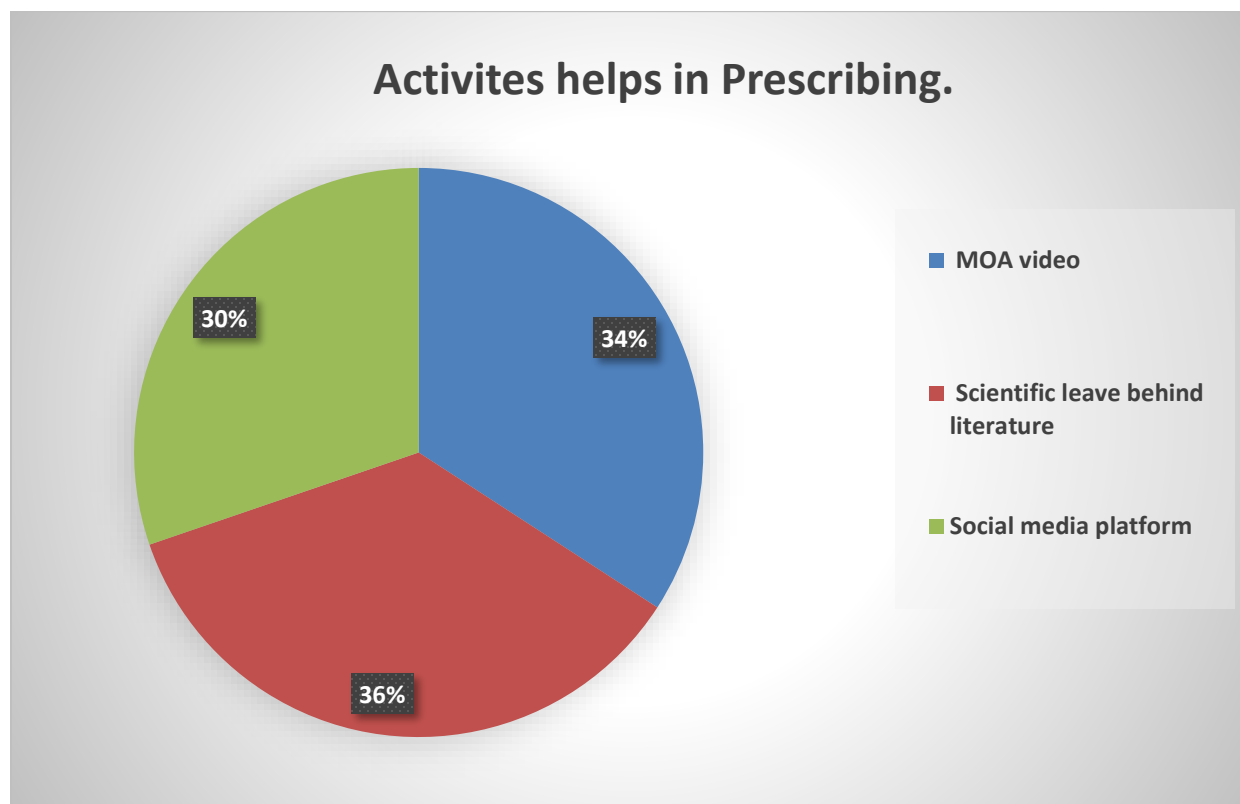
Interpretation: -

- It was found that 90% of the doctor's prescriptions influenced by the Safety of the molecules, Scientific points of the molecules, Cost of the molecules, Company Image, Quality of molecule Creative communication/ in clinic activity by the company.
- Only 10% of the doctor's prescriptions influenced by the Equity with field force.

9. Doctor which of the following activities will help you in prescribing the Natural Surfactant.?

Prescribing Activity	Nos. of Responses
Celebrity Endorsed VA pages	0
MOA video	96
Scientific leave behind literature	100
In clinic gimmick activity	0
Social media platform	85
Any other please specify	0

Table 9: Activities helps in prescribing.



Figures 13: Activities helps in prescribing.

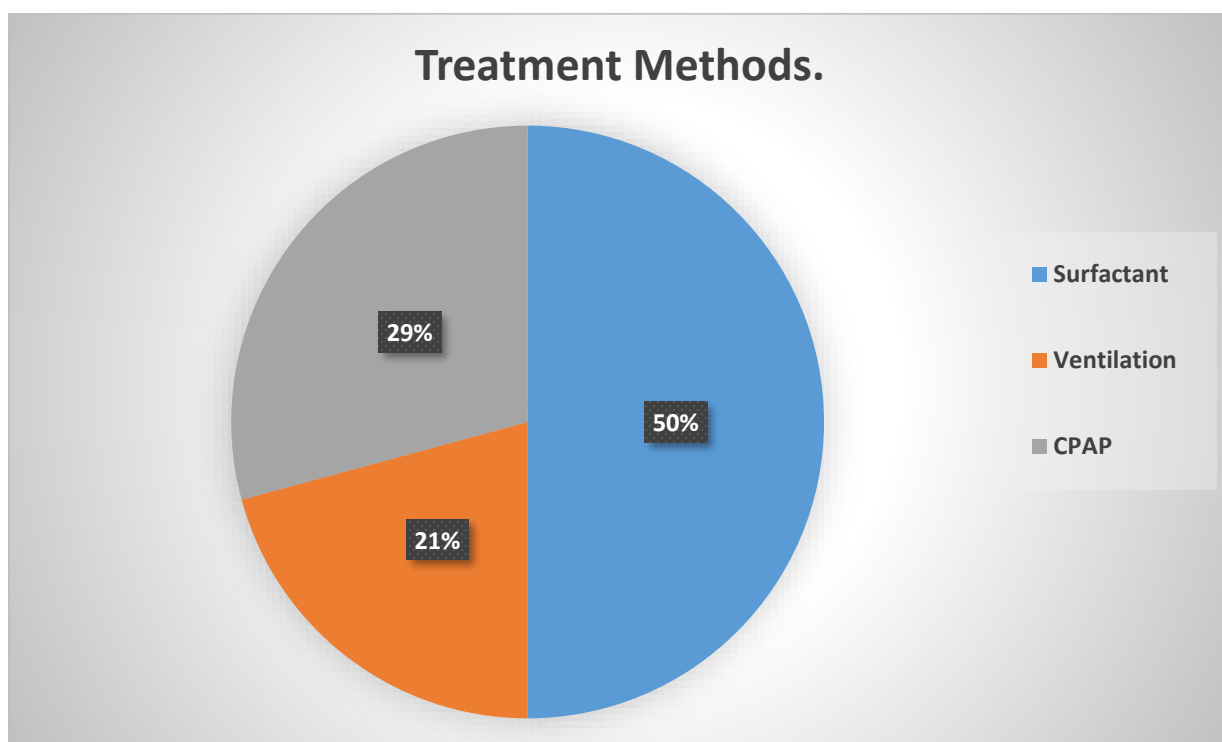
Interpretation: -

- It was observed that 70% of the doctors given response to the MOA video, and Scientific leave behind literature for prescribing.
- Only 30% of the doctors given response to the Social media platform for prescribing Natural Surfactant.

10.How Does you treat RDS Patients mostly.?

Treatment Methods	No. of Responses
Surfactant	77
Corticosteroids	0
Ventilation	32
CPAP	45
Any other	0

Table 10: Treatment Methods.



Figures 14: Treatment Methods.

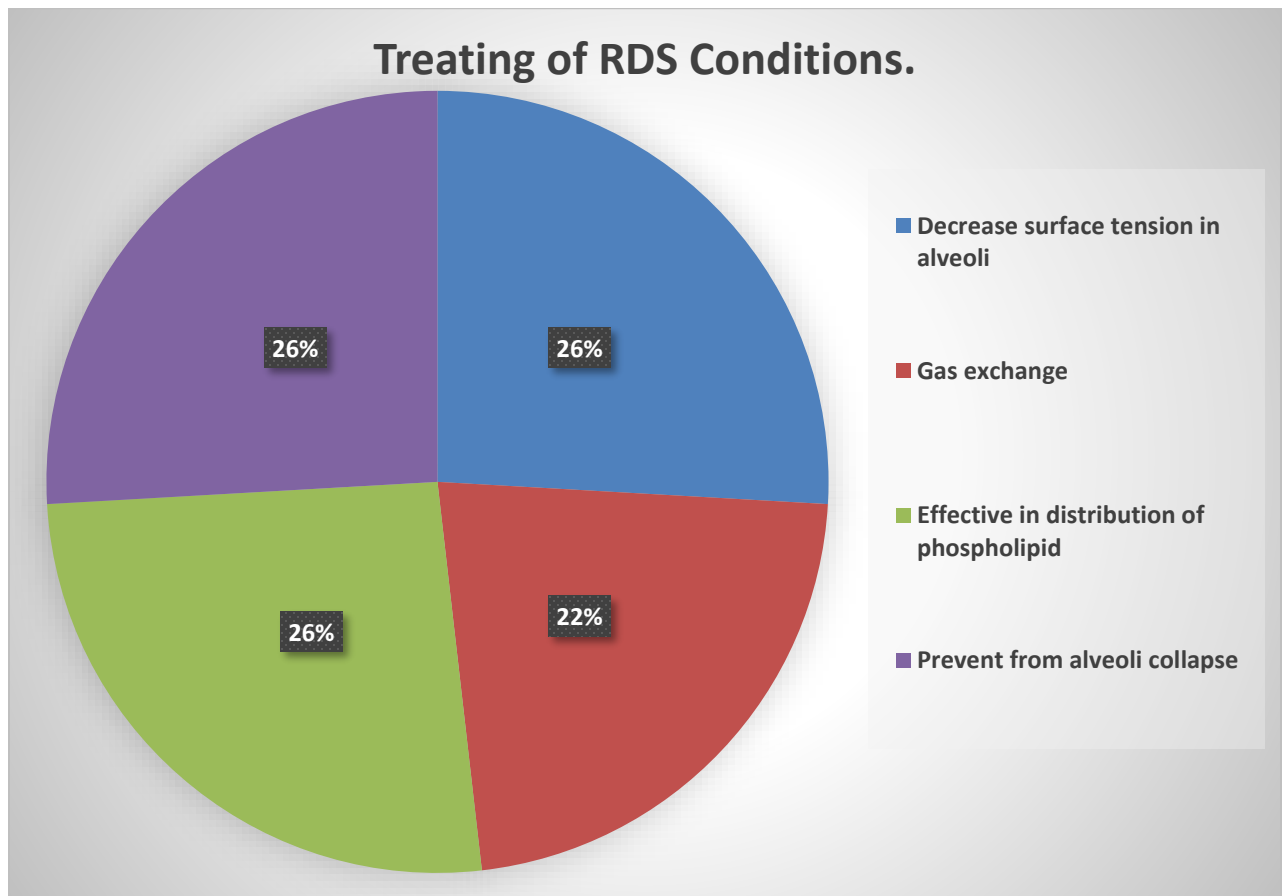
Interpretations: -

- It was found that 50% of the doctors used Surfactant mostly for treat the RDS patients mostly, but 29% of the doctors preferred CPAP and only 21% of the doctors preferred ventilation for treatment of RDS patients.

11.How does the use of surfactant help in treating the RDS Conditions.?

Treating Conditions	No. of Responses
Decrease surface tension in alveoli	100
Gas exchange	86
Effective in distribution of phospholipid	100
Prevent from alveoli collapse	100

Table 11: Treating of RDS Conditions.



Figures 15: Treating of RDS Conditions.

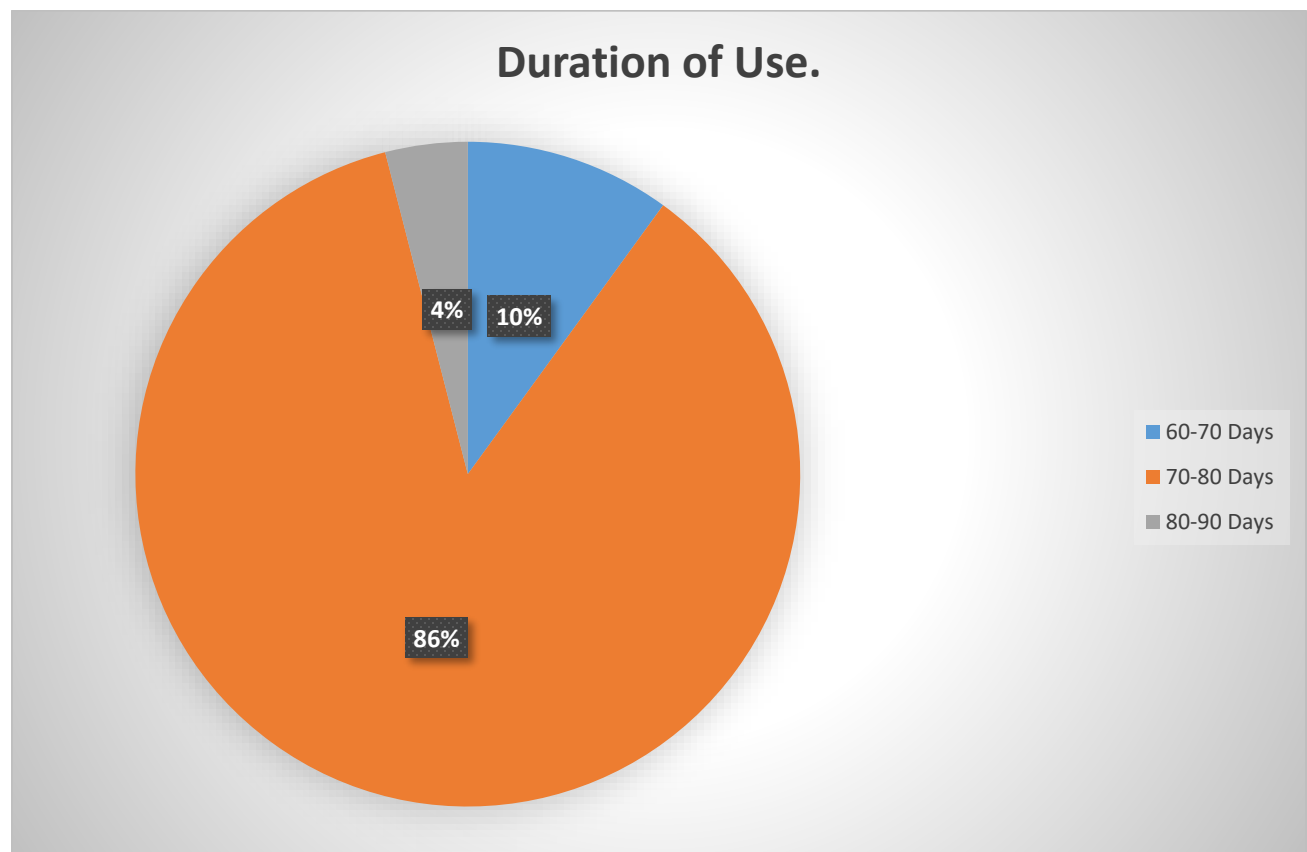
Interpretation: -

- All the 100% doctors are agreed that the used of surfactant will help in treating the RDS conditions i.e. by Decrease surface tension in the alveoli, Gas exchange, Effective in distribution with phospholipid, and prevent from alveoli collapse.

12.How long do you use Surfactant therapy to your RDS patients.?

Duration	No. of Responses
60-70 Days	10
70-80 Days	86
80-90 Days	4
90-100 Days	0

Table 12: Durations of Use.



Figures 16: Durations of Use.

Interpretations: -

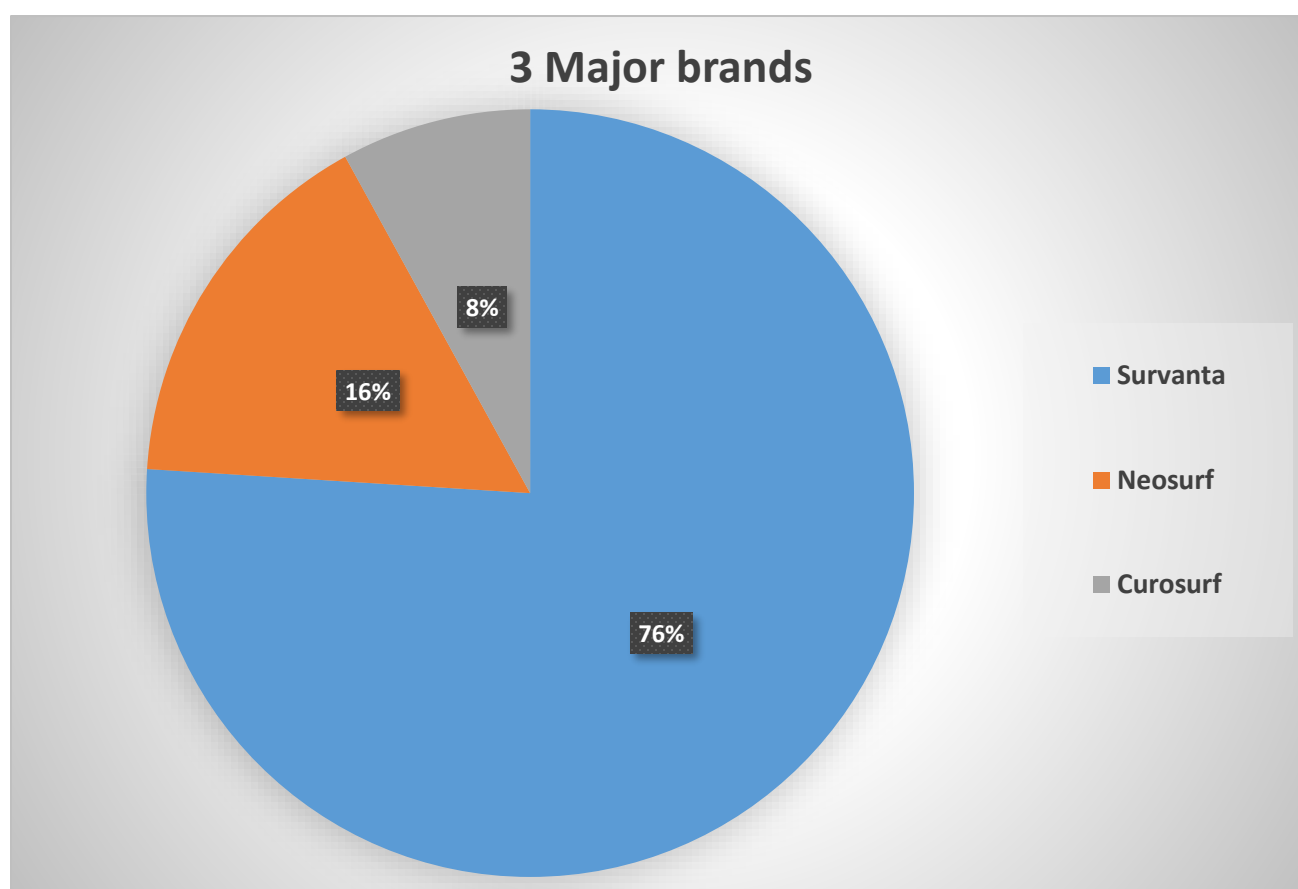
- It was observed that 86% of the doctors said that 70-80 days of hospitalization is required for the treatment of RDS Patients, 10% of the doctors said that 60-70 days of hospitalization is required for the treatment of the RDS patients, and only 4% of the doctors said that 80-90 days of the hospitalization is required for the treatment of RDS patients.

Data Analysis of Chemists Responses.

1. Which are the 3 major brands of surfactant selling most on your counter.?

Major Brands	No. of Responses
Survanta	76
Neosurf	16
Curosurf	8

Table 13: Top 3 major brands.



Figures 17: Top 3 major brands.

Interpretation: -

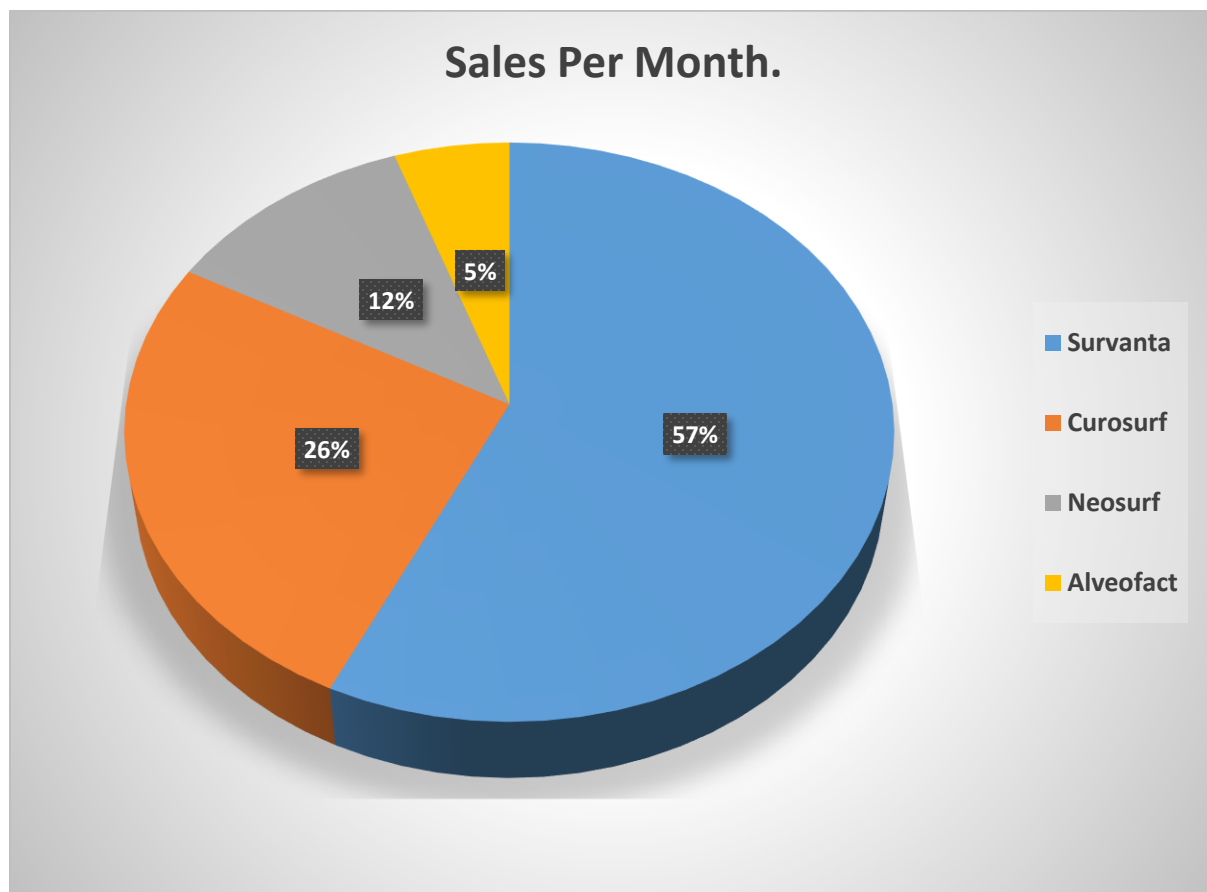
- It was found out that 76% of the retailers sell Survanta most on the counter, 16% of the retailers sell Neosurf most on their counter, and 8% of the retailers sell Curosurf most on their counter.

So as per the above data Survanta is the highly selling brand in the selected cities of Uttar Pradesh.

2. How much do you sell.?

Brand Names	Sales/Month
Survanta	215
Curosurf	98
Neosurf	44
Alveofact	20

Table 14: Sales Per Month.



Figures 18: Sales Per Month.

Interpretation: -

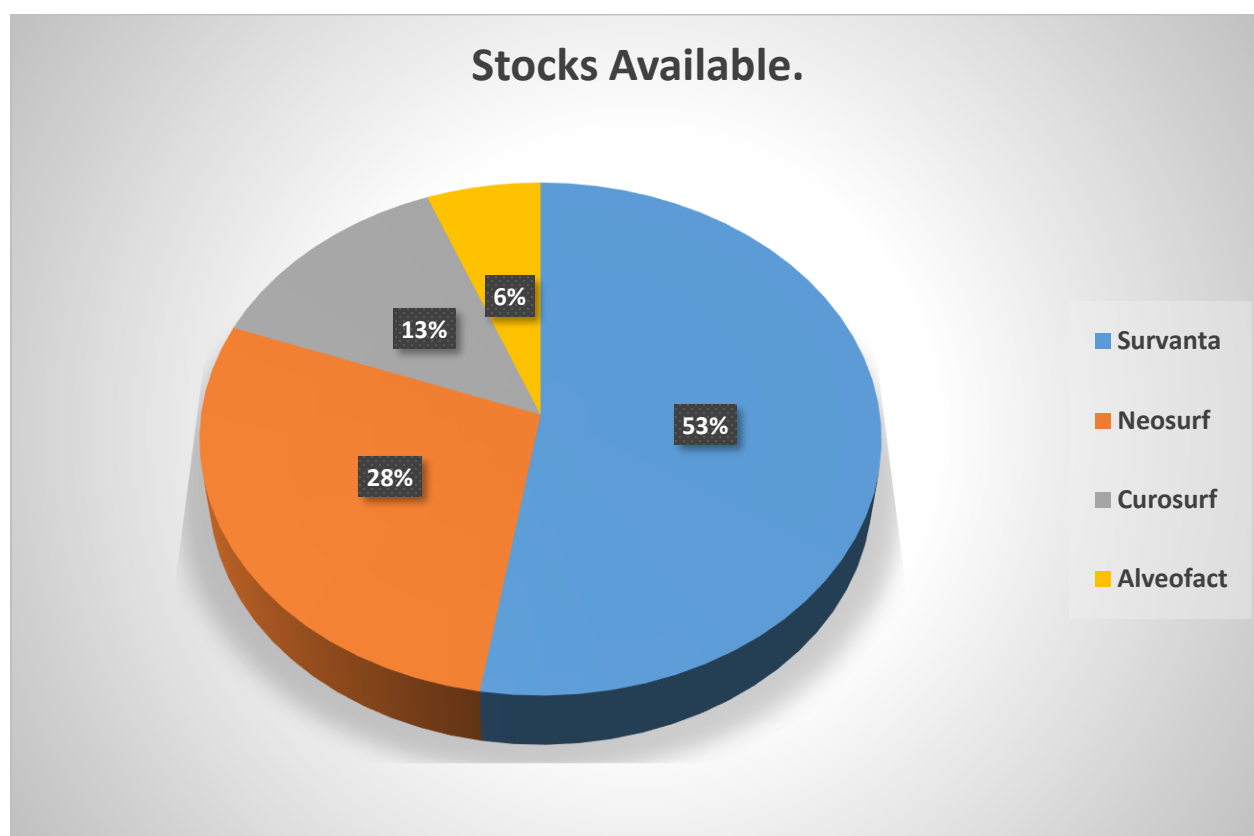
- It was observed that according to the total respondent 57% of retailers said 215 vials Survanta sold per month, 26% of retailers said 98 vials of Curosurf sold per month, 12% of retailers said 44 vials of Neosurf per month, and 5% of the retailers said 20 vials Alveofact sold per month.

So as per above data Survanta is the highly selling Natural Surfactant per month in the selected cities of Uttar Pradesh.

3. How much stocks do you have now.?

Brand Name	Stocks Available
Survanta	71
Neosurf	38
Curosurf	18
Alveofact	8

Table 15: Stocks available.



Figures 19: Stocks available.

Interpretation: -

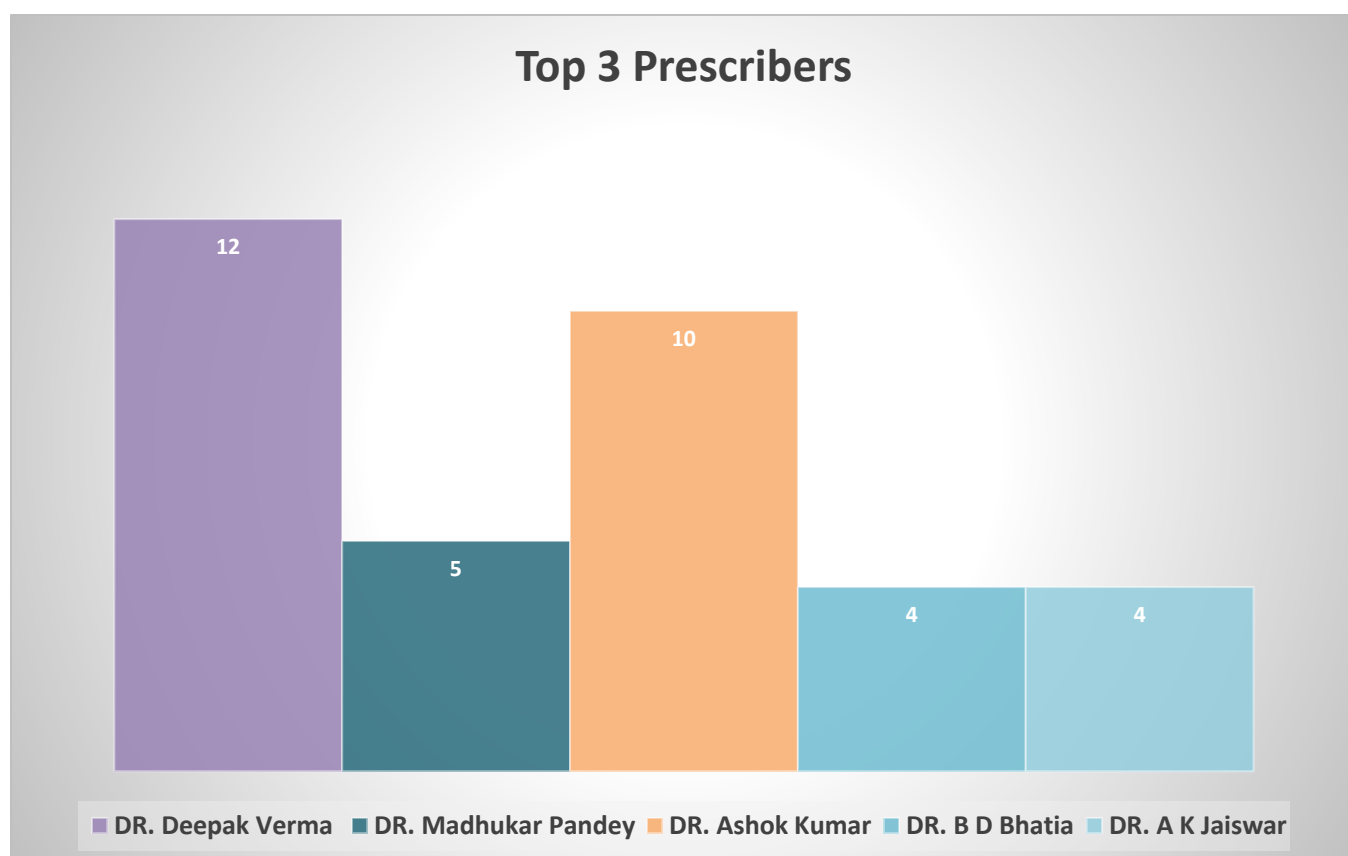
- It was found that 53% of the retailers have 71 vials stock of Survanta, 28% of the retailers have 38 vials stock of Neosurf, 13% of the retailers have 18 vials stock of Curosurf, and 6% of retailers have 8 vials stock of Alveofact.

So as per above data Survanta is highly available stocks of Natural Surfactant in the selected cities of Uttar Pradesh.

4. Who are the top 3 prescribers of Natural Surfactant brands and how much doctors prescribes.?

Doctors Name	No. of Prescriptions.
DR. Prabhat Kumar	3
DR. Deepak Verma	12
DR. Madhukar Pandey	5
DR. Ashok Kumar	10
DR. B D Bhatia	4
DR. DEEPAK PANDEY	3
DR. Vishwa Mohan Bhatia	3
DR. A K Jaiswar	4

Table 16: Top 3 Prescribers.



Figures 20: Top 3 Prescribers.

Interpretations: -

➤ It was observed that the top three potential prescribers of Natural Surfactant are

- Dr. Deepak Verma
- Dr. Ashok Kumar
- Dr. Madhukar Pandey.

Competitive Analysis.

SL/ No.	Parameter	Alveofact	Survanta	Curosurf	Neosurf
1.	Source	Bovine Lungs/ Lavage	Bovine Lungs/ Minced	Porcine Lungs/ Minced	Bovine Lungs/ Lavage
2.	Dose per Kg	50mg	100mg	200mg	135mg
3.	Volume per Kg	1.2ml	4ml	1.5ml	5ml
4.	Available SKUs	1.2ml	4ml & 8ml	1.5ml & 3ml	3ml & 5ml
5.	Active phospholipid concentration per ml	45mg	25mg	80mg	27mg
6.	Warming required	Not required up to 30 °C	Yes	Yes	Yes
7.	Vial Wastage	Nil	Yes	Yes	Yes
8.	Storage Temperature	Up to 30 °C keep in fridge considering Indian temperature conditions	2-8 °C Ampoule	2-8 °C Ampoule	2-8 °C Ampoule
9.	Phospholipid %	90% Phospholipid	84% Phospholipid	99% Phospholipid	40% DPPC
10.	Viscosity	8 times less Viscous	High	High	8 times less Viscous
11.	SP-B & SP- C	SP-B: 5.2 ±0.6	SP-B: 1.3 ±0.2	SP-B: 3.2 ±0.5	Not defined

	Concentration	SP-C: 12.9±1.7	SP-C: 16.9±3.7	SP-C:10.1±1.5	
12.	Stability	36 months	15 months	15 months	36 months
13.	Infants requiring one dose only	78.10%	51%	73%	Not Available
14.	Cost for initial Treatment	3515 Rs.	13178 Rs.	12280 Rs.	8897 Rs.

Conclusions

- It was found out that most selling Natural surfactant brands in selected Cities Uttar Pradesh i.e. 76% Survanta.
- It was observed that most selling Natural surfactant dosage strength in selected cities of Uttar Pradesh i.e. 4ml Survanta.
- It was found out that Dose per Kg required of Natural Surfactant in selected cities, Uttar Pradesh i.e. 45mg Alveofact, 100mg Survanta, 200mg Curosurf, and 135mg Neosurf.
- The overall finding of the study helped us to understand the prescription behavior and the reason behind the compliance they are facing while prescribing Natural Surfactant.
- The cost and dose are the two main factors that influence the prescription of Natural Surfactant.
- The Target consumer: Marketing efforts are more likely to be successful if they are aimed at consumers, rather than at the public at large.
- Almost all the Neonatologist & Pediatricians preferred Natural surfactant for the treatment of NRDS. Natural surfactant has shown to have a better prognosis than synthetic surfactants.
- The intraventricular haemorrhage, pneumothorax and rate of bronchopulmonary dysplasia were equal among patients treated with Alveofact, Curosurf, Neosurf and Survanta. The doctors preferred brand for the treatment of neonatal respiratory distress Syndrome in preterm baby is Survanta because of high margin on Survanta in hospital pharmacy and as well as well-established Natural surfactant brand for the treatment of NRDS patients.
- There is another reason of doctors to preferred Survanta is pre-filled suspension vial. Survanta is available in suspension form and no need to make suspension as in Alveofact

is available in lyophilized form and before injecting in to the baby we have make it into Solution form.

- Alveofact as compared to Survanta, Neosurf and Curosurf showed significantly fewer days for mechanical ventilation as well as fewer days on supplemental oxygen therapy and eventually it reduces the hospitalizations days of the patients.

Recommendations

- Identify the Key Opinion Leader and served with more frequently with excellent customer service.
- Introduce the Cross Promotional strategy (either with own Product or competitors Product)
- Introduce the Subjective Positioning Strategy.
- By preparing the promotional strategies helps in Improving the sales of the product.
- Regular visit along with time to time activity influence the doctor to prescribe the brand.
- Marketing Managers identifies target consumers and discovers their desires in order to design an effective marketing mix.
- Determining Consumer Desires: Effective marketing strategy requires a knowledge of consumer desires; the benefits that consumers seek.
- Medical Representatives should be trained well by the organisations regarding the use of iPads/Tablets and pharmaceutical organisations should have a dedicated tech support team to resolve issues in call reporting or any other software or hardware issues faced by the sales force in day to day activities.
- There is need of Conducting conferences, CMEs, & RTMs with the help of this activities Neonatologist KOL and Pediatricians in that conference, we can address the other doctors regarding the Natural surfactant compositions, attributes of ideal Natural surfactant, dosage form and regarding surfactant compositions in treatment of NRDS.

- Reminder Cards, Stickers and Gifts like Diaries, pen, or calendar can be given to doctors and hospital pharmacist for prolong relationship with the company and as well as for brand recognitions.

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