Sensitivity and Specificity of Cell Block Method in Diagnosis of Lung Malignancies.

Santoshpawar[1], Sameer M.A[2], Manishaahuja[3], Amitapatil[3]

[1]Assistant Proffessor
[2]Associate Proffessor,
[3]Residents

Abstract: *We used Cell Block Method For Cytological Diagnosis Of Lung Malignancies .The samples which were given Positive and Suspicious for malignancy on conventional smear were processed on cell block . Total 75 samples were processed on conventional smear ,out of which 50 samples which were given Positive(42) and Suspicious(08) for malignancy on conventional smear were processed on cell block and we found opn cell block Positive for malignancies were (48) And Negative For malignancy were(02). We found Sensitivity and specificity of cell block method in diagnosis lung malignancies were 96% and 92.59% respectively as compared to conventional smear method.*

I. Introduction

Cancer is known as the 'Emperor Of Maladies', and pulmonary malignancy its undisputed king.Lung malignancies are the most common cancer afflicting the human race and which far outruns any malignancy in sheer number and worse prognosis.Lung malignancy was typically described as a disease of industrial revolution and urbanization,but with rampant tobacco abuse it reached epidemic proportions.The disease was typically confined to middle aged to elderly smokers but the changing demographics and habits have shown an increasing trends of lung malignancy in females and non-smokers.And even after long and laborious years of research lung malignancies even today beseech curative treatment.

World Scenario.

Lung cancer is currently the most frequently diagnosed major cancer in the world(estimated 1.6 million new cases in 2008) and most common cause of cancer mortality worldwide(1,380,000 deaths in 2008).

Lung cancer is one the most frequent cause of death world wide among both men and women, an estimated 226,160(14%) new cases and 160340 deaths (28% of all cancer deaths) in 2012 in United states.[1]

Lung cancer has suppressed stomach cancer to become most common cancer in world .The geographic variation reflects prevalence of cigarette smoking. Incidence and mortality is highest in Men in developed countries. Despite many aggressive approaches to therapy and new chemotherapeutics , survival rates changed little in last decades. The ultimate goal is to provide novel approach to combat lung cancer by its early detection and cure by devising new chemotherapeutic agents.[2]

Indian Scenario

The National Cancer Registry Programe ofthe Indian Council of MedicalResearch, which collected data from six different parts of the country, both rural and urban areas, showed varying figures in different areas. Whilecancer of the trachea, bronchus and lungs was the most common form of malignancy in males in 1989 from Bombay, Delhi, and Bhopal, it wasthe second most common in Madras and third in Bangalore, and was most unusual in Barshi, a rural area. The disease was uncommon in females and only in Bombay it was the sixth common malignancy while in Bhopal, it was the seventh in rank.[3]

Hospital data from different parts of the country has also shown different patterns. Behera and Kashyapanalyzed the pattern of malignancy in patients admitted to PGIMERChandigarh from 1973 to 1982 and found that of the 223,930 hospital admissions, there were 863 lung cancer cases (0.38%). Lung cancer was the fifth common cancer after lympho-reticularmalignancy , carcinoma cervix, oro-pharyngealcancer and carcinoma of breast. The total number of lung cancer admissions steadily rosefrom 1973.[4]

As of 1st July 2002 a total of 41,000 cases of lung cancer would have been diagnosed for that year in India as per the ICMR data from itsCancer Registry[3].According to Globocon 2008,In India, lung cancer is the commonest and most lethal cancer among males accounting for 10.9% of all cancer cases and 13% of cancer related mortality [5].

Previously Squamous cell carcinoma was more common in males and in smokers, the incidence of Adenocarcinoma has increased significantly in last 2 decades. Adenocarcinoma is now the most common form of lung cancer in women and in many studies, in men also. The basis of this change is unclear . A possible

factor is the increase in female smokers , but this only highlights our lack of knowledge about why women develops more adenocarcinomas .One possibility is that changes in cigarette type (Filter tips, lower tar and nicotine) have caused smokers to inhale more deeply and thereby expose more peripheral airways and cells(with a predilection to adenocarcinoma) to carcinogens[6]

.
Different Techniques For Diagnosis of Lung Cancer.
      There are various invasive and non-invasive methods to diagnosed lung cancer,
1) **Chest X ray-** Patients with lung cancer often have obstructive features, Pleural effusion.Lung cancer patients rarely presents with normal X ray. Chest radiography is simple, cost-effective measures and it imparts very little radiation to the patient. Naturally, it routinely carried out at every institute.
2) **CT/MRI scanning-** Results from computed tomography (CT) scanning are subject to variation caused by different scanning technique, but suggest that CT scanning of the chest has a high sensitivity (89-100%) but a relatively low specificity (56-63%) and poor negative predictive value(60-100%).
    CT has now become the main stay of staging chest malignancies and is routinely performed at all major centers in India. Superiority of MRI over CT scan for the detection of bronchial and chest wall invasion or nodal staging is unestablished. Also as the CT is less expensive and wildly available in India, it is preferred and routinely advised.
3) **PET scanning-** Positron emission tomography scanning has a diagnostic sensitivity of 96% and a specificity of 78% but there is considerable variation in studies included. The diagnostic studies indicate negative predictive value as low as 47%.
    The considerable cost of the instrument imaging agents as well as the short half life of positron emitting isotopes, has prevented wide spread acceptance and hence these units are available at few centers only.
4) **Bronchoscopy-**The value of bronchoscopy is depend on location of primary tumor. Peripheral tumors in subsegmental bronchi may not be visible. Flexible bronchoscopy has good diagnostic sensitivity(83-88%) for central lesions.
    Bronchoscopy is done in India, and overall diagnostic yield of bronchial forceps biopsy and brushing for central lesions ranges from 70 to 90% depending on the site and visibility of lesion.
5) **Fine Needle Aspiration/ Percutaneous Biopsy-** Percutaneous needle biopsy is a highly sensitive technique for diagnosing lung cancer(Sensitivity of 88% to 92%). Fine needle aspiration can be done as blind percutaneous biopsy or guided by fluoroscopy, ultrasound, CT or magnetic resonance imaging(MRI). There is high false negative rate (25%) resulting in limited ability to confirm a benign diagnosis.
    In India, mediastinal lymph node can be staged by transbronchial needle aspiration(TBNA), which if positive , can preclude the need for further surgical staging.
6) **Sputum Cytology-**There is wide variation (10 to 97%) in the sensitivity of sputum cytology in diagnosis of lung cancer. High sensitivity is only achieved by use of specific and carefully controlled protocols for sample collection.
7) **Thoracosopy / Mediastinoscopy-**Thoracoscopy is to be considered for patients with suspected lung cancer where less inavasive means have not achieved histological and cytological diagnosis.[7]
8) **Pleural Fluid Cytology-**Examination of pleural fluid for malignant cell is useful in diagnosis of lung malignancies.
    There are various methods are available eg Conventional Smear method ,Cytospin or Cytocentrifuge method , Cell block method which can be carried on pleural fluid. Every methods has its advantages and disadvantages.Conventional Smear method is most commonly performed method in many institutes as it is rapid, cost effective.

Cell Block Method- History
    After Introduction of the paraffin block method on serous effusions by**Beale in 1895**,the examination of fluid has become a routine diagnostic procedure.[8]
    In **1895, Bahrenberg** allowed a large quantity of fluid to stand and clot spontaneously. After pouring off the supernatant fluid the clot was shrunken and hardened by successive addition of alcohol until a small stringy mass was obtained. This was finally embedded in celloidin and cut like tissue. He was able to find epithelial cells in two ascitic fluids with the aid of this technique. The autopsy in these cases revealed carcinoma involving peritoneum[9].
    In **1917 Mandelbaum** devised a technique for the preparation of cell block. He found that the procedure was of great diagnostic value in cases of carcinoma originating in the ovary, breast, lung, pancreas, gastrointestinal tract and kidney[9].

Advantages Of Cell Block Methods.
1. Concentration of cellular material in one small area that can be evaluated at a glance with all cells lying in the same focal plane of microscope.
2. Preservation of architectural pattern like cell balls, papillae and three dimensional clusters.
3. It shows intact cell membranes and crisp chromatin details. It bridges the gap between cytology and histology.
4. There is adequate cellularity and delineation of nucleus and cytoplasmic details.
5. Loose cells, cell aggregates and microscopic tissue fragments are easilyrecoverable.
6. Cell block sections are suitable for histochemical stains and IHC.
7. The method is simple, reproducible and readily adaptable in routine hospitallaboratory.[10]

Disadvantages of cell Block Methods
1. There is delay in diagnosis by cell block method as compared to conventional smear.
2. There is risk of loosing material during processing.
3. Due to centrifugation artifacts mesothelial cells may form pseudoacini, pseudopapilla that may cause confusion.[10]

II.   Aims And Objectives
1) To evaluate the sensitivity and specificity of cell block technique versus conventional smear study in diagnosis of lung malignancies.

III.   Review Of Litreture
Previous Studies Related to Cell Block Methods.

Most cytologist used cell block technique introduced by **Baherenberg**and **Mandlebaum** till second world war, after that conventional smear technique became routine due to introduction of Papanicoloau stain which gives better nuclear features.[11]

In 1972, Richard et al proved that for sepration of pleural fluid transudates from exudates , the simultaneous use of pleural fluid protein and LDH levels are more effective.[12]

Kanhouwa et al, did histopathalogic and cytopathologic correlation in typing of lung carcinoma. Diagnosis was concurrent in 77.5%.The discrepancies occurred between epidermiod carcinoma and poorly differentiated adenocarcinoma.[13]

In a study conducted by **Dekker A et al, Bupp PA(1978**), they examined approximately half of 351 body cavity effusions from 263 patients prospectively in paraffin embedded cell blocks and in smears, while the other half were examined in smears only. Number of suspect and positive fluids obtained with cell block and smear technique was double the specimens examined in smears only.

They also found that cell blocks are particularly useful when the cytological abnormalities are misleading such as in reactivemesothelial cells, or obscure, as in occasional well differentiated adenocarcinoma. They also recommended that both cell blocks and smears should be used in evaluating all fluids submitted to cytology laboratory.[14]

Nithyananda et al(2000) in a cytological examination of 544 fluid samples found 95 malignant cases with smears positive in all cases and almost identical finding in the cell block.[15]

In 2000, Sujathan et al , proved that modified cell block technique produced histological sections of excellent quality. They are simple, rapid and cost effective.[16]

Effie Narayan et al in 2000, showed that cell block prepared from residual tissue fluids are particularly useful for tumors that otherwise are not diagnosed in smears . A modified cell block technique using an improved ethanol formalin fixative followed by paraffin processing gives excellent cytomorphological features.[17]

In 2003, Bodele AK et al shows that cell block technique using 10% alcohol- formalin was simple, inexpensive and does not require special training. By using formalin , the proteins are cross linked and a gel formed which can not be dissolved in any material used for processing thus minimizing the cell loss. By this method multiple sections can be obtained for special stains and IHC studies[18].

In **2005 Khan N et al** in a study of cytodiagnosis of malignant effusion and of determination of primary site, found that adenocarcinomas are the commonest type of neoplastic cells found in serous fluids[10].

Manisha et al(2009) in a study using 72 cell blocks prepared by thrombin plasma technique using surplus fluid from 38 effusions, 32 ultrasound guided FNAC material, rinses of syringes and needles, found that the absolute concordance was seen in 66 samples (94%) between the smears and cell blocks and also concluded that, in cell block method there were cellular concentration in a limited field and better cellular preservation with architecturalpattern.[19]

ThaparM,et al. 2009,found in a critical analysis of cell block versus smear examination, out of 190 cases, 70 cases were found to be malignant.

Using a combination of cell block and smear technique yielded 13% more malignant cases than what were detected using smears by themselves

. The combined technique helped to ascertain the primary site of malignancy in 83.3% of the cases whereas the primary site could not be ascertained in 17.7% of the cases.

Cell block technique not only increased the positive result but also helped to demonstrate architectural patterns which could be of great help in making correct diagnosis of primary site. The technique was also useful for special stains and immunohistochemistry. It can also give morphological details by preserving the architectural pattern.[20]

In **2012 by Shivkumarswamy et al**, found that Cellularity and additional yield of malignancies was 15% more by cell block method.[21]

Shobha N et al in 2013 in Study called Cytodiagnosis of serous Effusion concluded that additional yield of malignancy by cell block method was 46.15% more compared with conventional smear method.[22]

In 2014 Archana J et al, concluded that cytospin and cell block method provide high cellularity ,better architectural pattern, morphological features and additional yield of malignant cells and thereby increases the sensitivity of the cytodiagnosis when compared with conventional smear method.Total 34 patients with malignant effusion out of which only 14 were diagnosed on conventional smear while cell block and cytocentrifuge diagnosed all 34 cases of malignant effusion[23]

In 2014 Bhavana et al, concluded that cell block technique when used adjuvant to routine smear examination has increased the diagnostic yield because of better preservation of architectural pattern.There were additional 12(11.94% additional yield by cell block) cases were diagnosed on cell block that were missed on conventional smear[24]

In 2014 RichaNathani et al, concluded that additional yield of malignancy by cell block method was 5% more compared with conventional smear[25]

IV.   Materials And Methods

Place   -Tertiary Care Hospital.

Study population:

Patients admitted under department of pulmonary medicine and department of medicine with features suggestive of lung malignancies egHaemoptysis, recurrent pleural effusion, Cervical and mediastinallymphadenopathy andPatients presenting with undiagnosed lung masseson radiology.

Study Design   The present study is prospective, hospital based , descriptive study.

Study Period   18 months from 01-01-2013 to 30-06-2014.

Inclusion Criteria

Patients admitted under department of pulmonary medicine and department of medicine with features suggestive of lung malignancies eg Haemoptysis, Recurrent pleural effusion, Cervical and mediastinallymphadenopathy and Patients presenting with undiagnosed lung masses on radiology.

Exclusion Criteria

Diagnosed patients with lung malignancies are excluded from study.

V.   Methodology

The study variables:

Socio-demographic characters:

1) Name
2) Age
3) Sex
4) Caste/ Religion
5) Residence.

Clinical History:

1) Presenting Complaints.
2) Any Hospitalisation in past
3) Past History.
4) Family History.
5) Chronic Illness.
6) Physical Examination: General and Systemic examination.

Laboratory Parameters:
1) Baseline Hematological test s:Hb,CBC,Platlet Count.
2) Liver Function Test.
3) Kidney Function Test.
4) Pleural Fluid Biochemistry: Glucose, Protein,LDH.

Radiological Investigations
1) X- ray chest.
2) Ultrasonography of Chest.
3) Computed Tomography of Chest.

All patients suspicious for lung malignancy were evaluated.

After detailed clinical and personal history, general and clinical examination was noted.

Radiological examinations like X-Ray chest, CT-Chest, and USG chest also take into consideration.

Patients clinically suspected for lung malignancy classified according to nature of sample recived as,

1)   Patients Presenting With Pleural Effussion,
After informed written consent, under strict aseptic precautions pleural fluid tapping was performed in wards by clinicians, and 10Ml of pleural fluid was sent to cytology lab in EDTA anticoagulated bulb within 2 hours of tapping.

The samples were immediately processed by conventional cytological smear preparation and on cell block preparation if found positive or suspicious For Malignancy hence same sample was evaluated for comparative study.

Other samples used are

2)   Usg Guided Fnac Of Lung Mass-
Tissue sample obtained byFNAC also processed both on routine cytology slide and cell block method.

3)   Bronchoalveoilar Lavage(Bal) Cytology-
Tissue sample obtained by BAL also processed both on routine cytology slide and cell block method.

Technique of conventional smear prepration-
5 ml pleural fluid sample centrifused at 2500 rpm for 15 min, then a thin smear was prepared from sediment , cytological smear was stained by hematoxylin-Eosin stain.
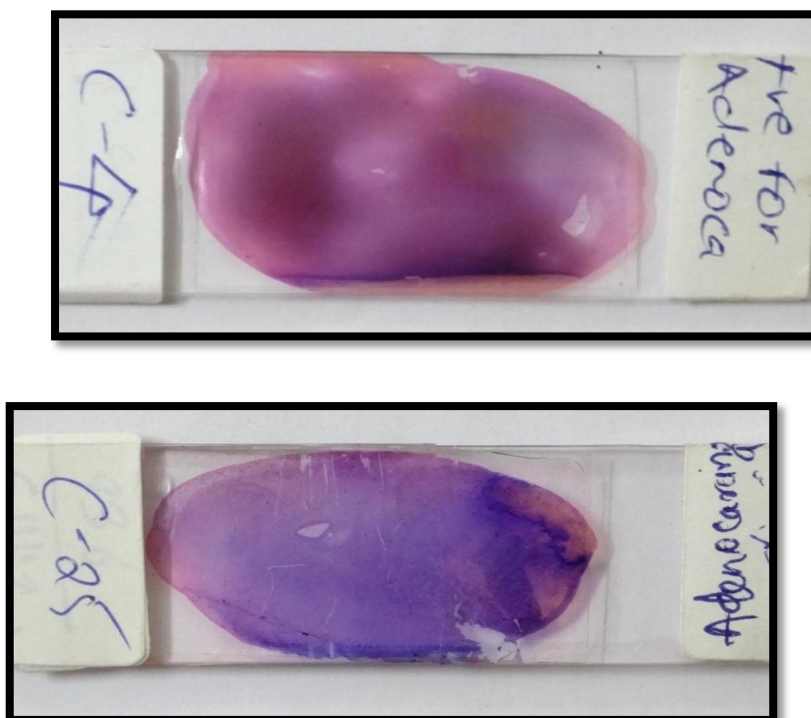

Fig 11—H & E Stained slide of conventional Smear.

Hematoxylin-Eosin staining method for conventional method.

After making smear from sediment on slide , slide is fixed in methanol after that slide dip in Hematoxylin for 15 min. then slide washed with tap water and dip in eiosin for 1 min. Slide mount with DPX and observed under microscope.

Technique of cell block preparation-

5mL pleural fluid then add 5mL 10% alcohol-Formalin , keep for 1 hour, then centrifuge for 2500rpm for 15 min. Discard supernatant and again add 3mL 10% alcohol – Formalin for 24 hrs to cell button.

After overnight fixation scoop out cell button and process as routine histopathology specimens.

Fig -12Showing centrifused pleural fluid ,cell button formation and prepared cell block.

The cell blocks are processed   as paraffin blocks of histopathology and stained by hematoxylin-Eosin, Other ancilliary-Auxillary techniques like Sputum cytology, lymph node aspiration would be performed and analyzed as routine cytological study as and when possible.The results are correlated with the Clinical and radiological findings.

Observations and Results.
Observations.

The Interpretation of conventional smear and cell block.

The samples were studied in detail, taking into account the available clinical data, various investigation reports and microscopic details. The samples were categorized as
1) Positive For Malignancy(PFM)
2) Suspicious for malignancy(SFM)
3) Negative for Malignancy (NFM).
The morphological criteria that were taken into account, included the
1) Cellularity,
2) Arrangement of the cells (acini, papillae and cell balls)
3) Cytoplasmic and the nuclear details of suspicious or malignant cells
4) Presence of inflammatory cells like lymphocytes, polymorphs,Mesothelial cells.

All these criteria were put together and they were used for the categorization of the sample. The cytomorphological characters were studied in detail to identify the malignancy .
 A comparative evaluation of the CS versus the CB techniques was conducted.

Interpretation Of Conventional Smear.
1) Positive For Malignant Cells (Pfm).
2) Suspocious For Malignancy(Smf) .
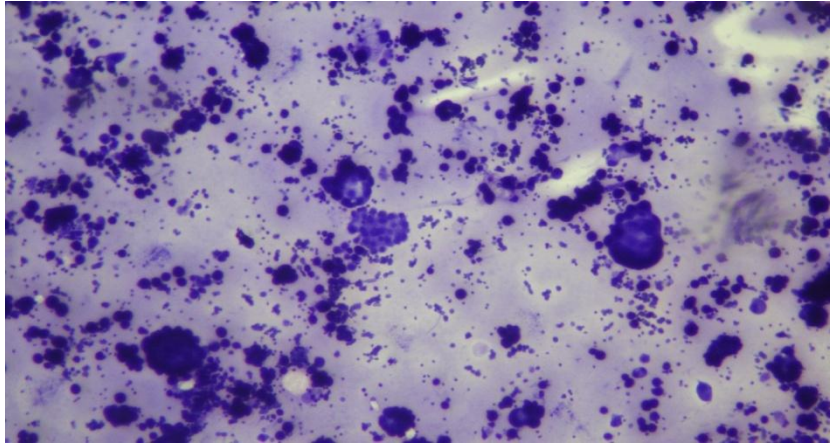3) Negative For Malignancy(Nfm) .

Image 1-Low power(10x) H & E-Pleural Fluid Cytology

-Smear study shows presence of Round to Oval atypical cells arranged in groups against inflammatory and mucinous background.
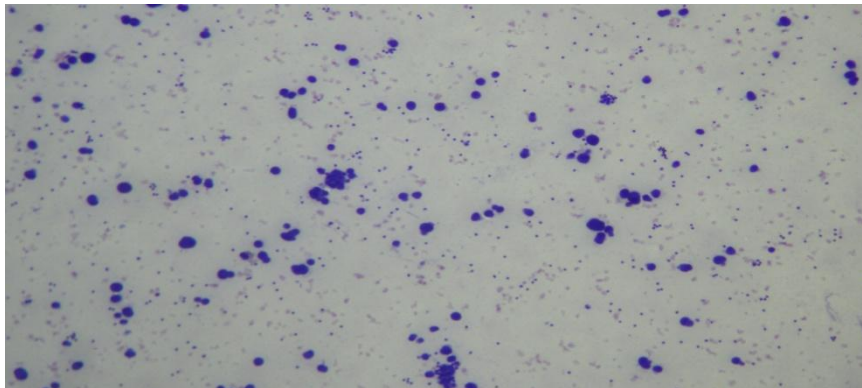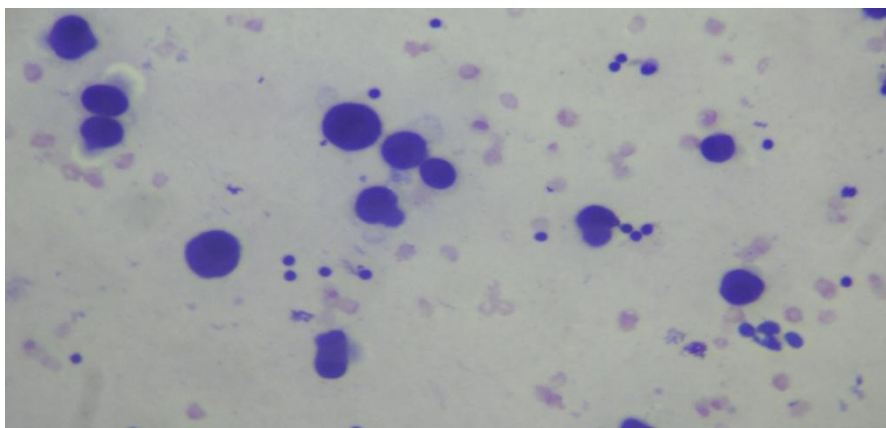Diagnosis given- Suspicious For Malignant Cells. (SFM)

Image 2)Low Power H & E- Pleural Fluid Cytology on conventional smear.

Smear study shows Scattared Round to Oval tumor cell over background of RBCs and inflammatory cells.
Diagnosis Was Given- Suspicious Of Malignancy (SFM).
(Adv: Cell Block Cytology)

Possible-Adv: Cell block Cytology.)

Image 3-High power H & E   Pleural Fluid Cytology-

Smear study shows presence of Round to Oval tumor cells having hyperchromatic,Pleomorphic nuclei and scant cytoplasm against haemorrhegic background.
Diagnosis given ---Positive For Malignant cells(PFM).

Image 4) Pleural Fluid Cytology- High power H & E Smear study shows atypical cells with eccentric nuclei with moderate amount of cytoplasm.
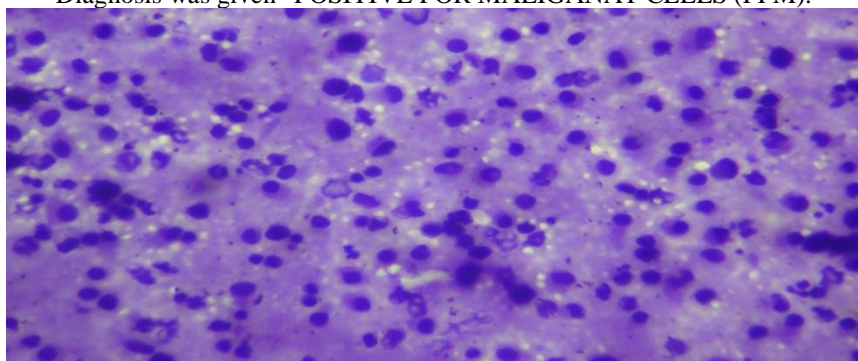Diagnosis was given--POSITIVE FOR MALIGANAT CELLS (PFM).

Image 5) Pleural Fluid Cytology –

High power   H& E stained- Smear study shows Many Large cells Having Hyperchromatic Pleomorphic Nuclei and Scanty cytoplasm on necrotic background material.
Diagnosis was Given- Positive For Malignant cells(PFM)- Typing Not possible.
Interpretation Of Cell Block Cytology
Smear which are Positive and Suspicious For Malignancy are processed
on cell block.
Due to better architectural pattern , cellularity , greater nuclear and cytoplasmic details typing of Lung Malignancies were possible. Smears interpreted as,
1) Positive For Malignant Cells-And Given Further Histological Typing.Egadenocarcinoma Of Lung, Squamous Cell Carcinoma Lung , Small Cell Carcinoma Lung Etc.
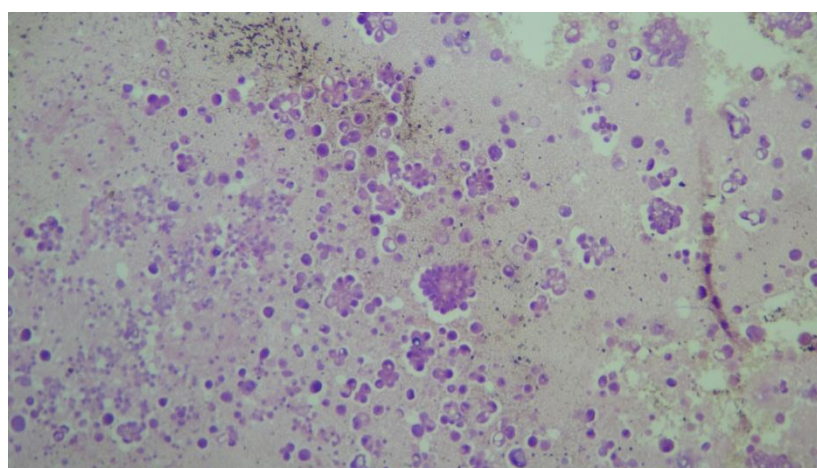
Image 6) Low Power H & E :Cell Block Cytology from pleural fluid sediments-- Smear shows round to oval tumor cells arranged in acinar , Glandular pattern.

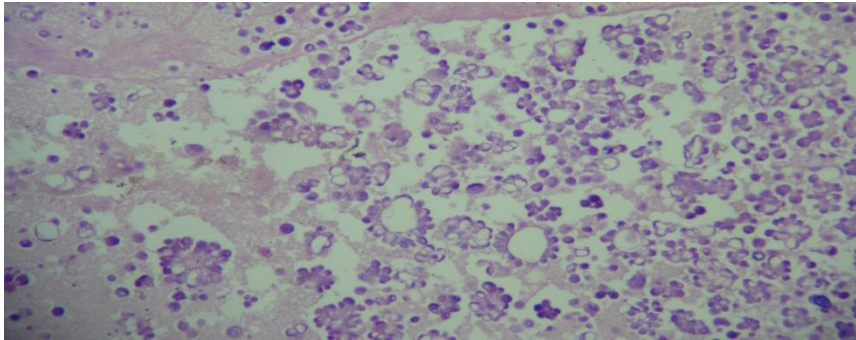Positive For Malignant Cells(Pfm) S/O Adenocarcinoma Lung.

Image 7) LOW POWER- H & E smear shows tumor cells arranged in Glandular and at places papillary pattern.POSITIVE FOR MALIGNANT CELLS(PFM) S/O ADENOCARCINOMA.
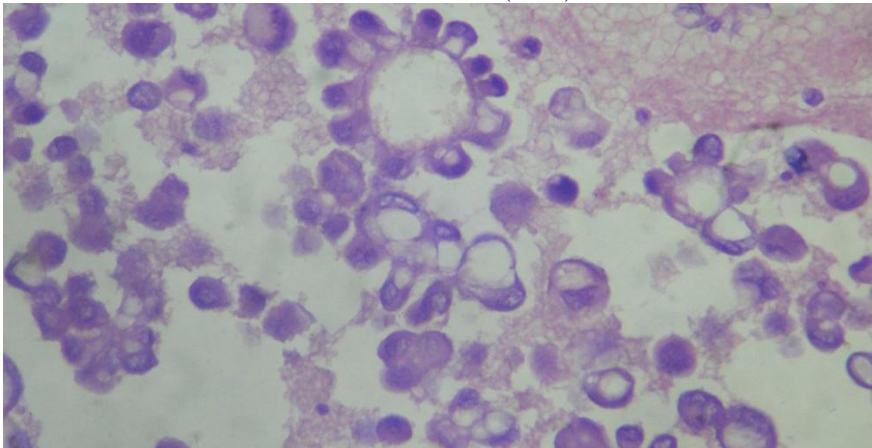

Image 8) High Power-H & E-Smear shows presence of tumor cells having hyperchromatic, pleomorphic ,eccentric nuclei and moderate amount of cytoplasm arranged in glandular pattern.positive for malignant (PFM)cell S/O Adenocarcinoma lung.
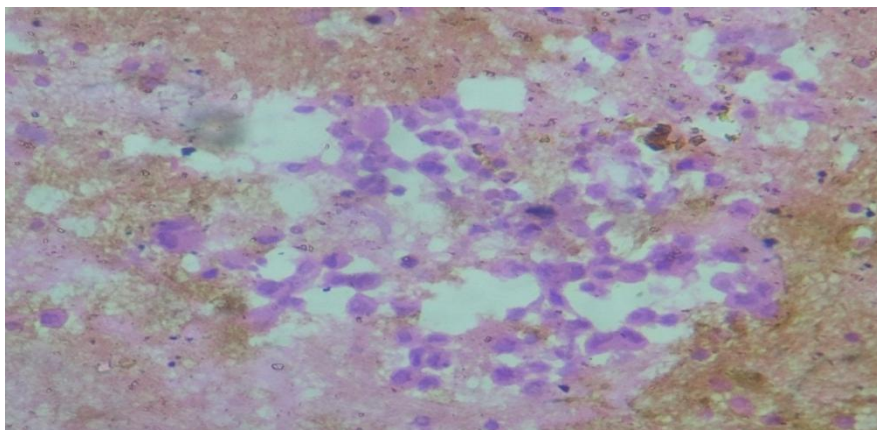

Image 9) Cell Block cytology H & E High power- Smear shoes presence of tumor cells having hyperchromatic pleomorphic nuclei and moderate amount of eiosinophilic cytoplasm arraned in sheets and clusters.
Positive For Malignant (PFM)cells- SQUAMOUS CELL CARCINOMA LUNG.

Comparision Between Conventional Smear And Cell Block Cytology.
1)   ADENOCARINOMA OF LUNG- Suspicious for malignancy found to be Adenocarcinoma on cell block method
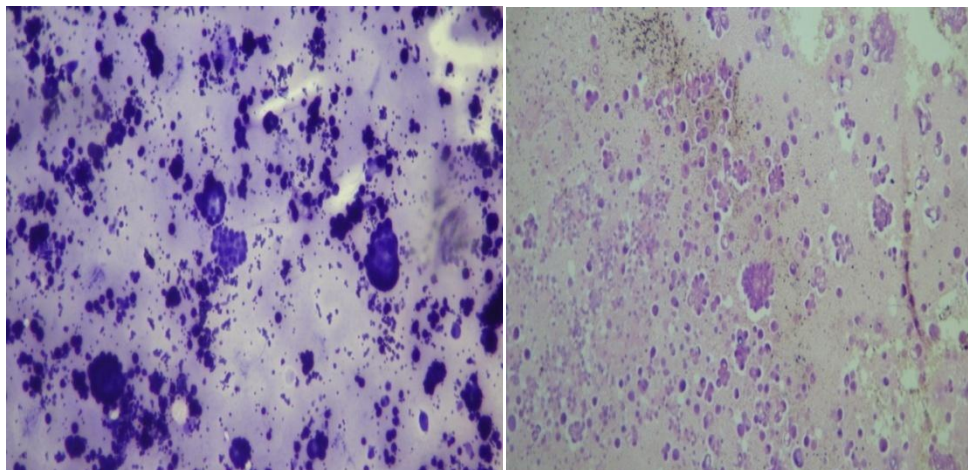2)

Image 10) 10x- H & E- Conventional smearand Cell Block On Same Pleural Fluid –

Conventional Smear shows presence of Atypical cells in groups and scattered on dirty necrotic background.
Diagnosis given- Suspicious For Malignancy(SFM)-(Adv-Cell Block Method)

On Cell Block-10x- H & E Cell Block Cytology - Section shows presence of tumor cells arranged in acinar and glandular pattern(PFM)-Adenocarcinoma of Lung.

2)SQUAMOUS CELL CARCINOMA- Suspicious for malignancy found to be Squamous cell carcinoma on cell block method.
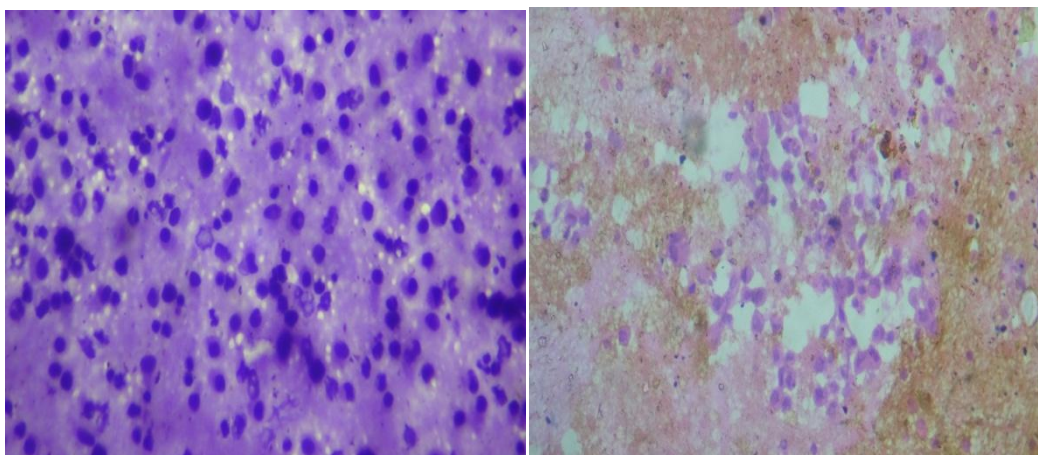

Image 11)**Left side**H& E Conventional Smear- Smear shows presence of atypical cells with hyperchromatic nuclei and scattered cytoplasm on necrotic background-(SFM)-Suspicious for Malignancy.
On Right, cell block section from same pleural fluid – section study shows presence of tumor cells havinghyperchromatic pleomorphic nuclei and moderate amount of eiosinophilic cytoplasm arranged in sheets and clusters-   Positive For Malignant (PFM)cells- SQUAMOUS CELL CARCINOMA LUNG.

3)Suspicious Of Malignancy On Conventional Smear Found To Be Adenocarcinoma On Cell Block Cytology.
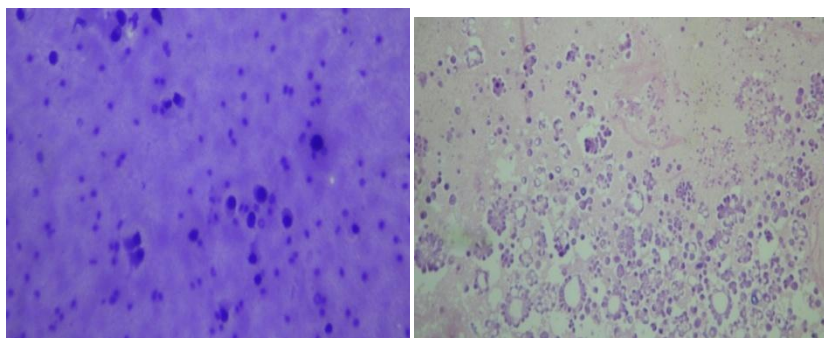
Image 13) Left side: H and E stained conventional smear shows scattered round to oval cells on necrotic background- Diagnosis- Suspicious for Malignancy.(SFM)
On Right, cell block on same pleural fluid sample- section shows tumor cells arranged in acinar and glandular pattern with hyperchromatic, eccentric nuclei and moderate amount.

4) Suspicious of Malignancy on USG Guided FNAC found to be Small Cell Carcinoma Lung On Cell Block Method.
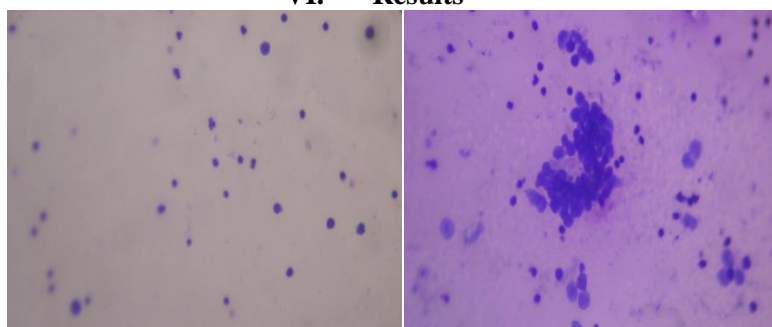
VI. Results

Image 13) Left side:Low Power USG Guided FNAC From Lung Mass Routine Conventional smear shows presence of small, round scattered tumor cells – Suspicious for Malignancy.
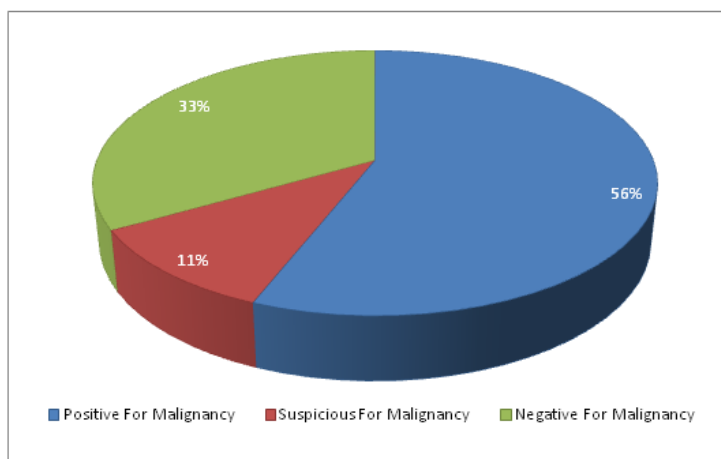
Right side:USG guided FNAC cell Block Method of same sample - Shows cluster of Round to oval tumor cells having hyperchromatic nuclei and scanty cytoplasm – Positive For Malignancy(PFM)-Small cell carcinoma lung

Table No. 1Diagnosis On Conventional Smear (n=75)

Sr. No.	Sample received from clinically diagnosed malignant cases.	No. of sample	Diagnosis on conventional smear		
			PFM	SFM	NFM
1	Pleural Fluid	66	33	08	25
2	USG guided FNAC of lung mass	08	08	00	00
3	BAL cytology.	01	01	00	00
	Total	**75**	**42(56%)**	**08(10.66%)**	**25(33.33%)**

Out of total 75 samples processed on conventional smear, 42(56.00%) samples diagnosed as Positive For Malignancy(PFM), followed by 25 (33.33%) samples are Negative For Malignancy (NFM) and 08(10.66%) samples are Suspicious For Malignancy(NFM).

25 samples which are clinically suspected to be malignant found Negative For Malignancy(NFM), out of which 20 samples are Chronic Inflammatory smear and 5 are found to be tuberculous effusion on follow up.
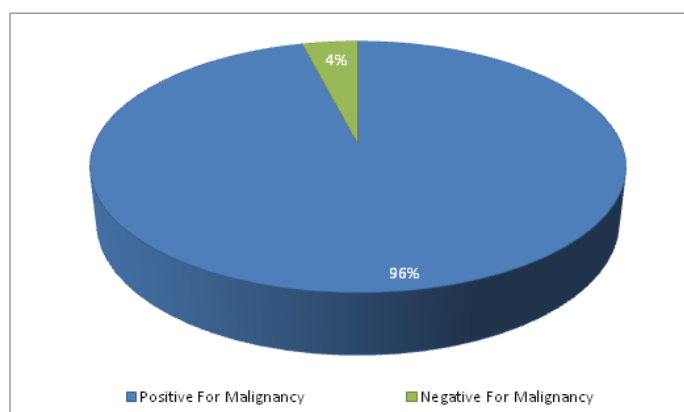
Graph No. 1: Graph showing Findings On Conventional Smear (n=75)

Table No 2:   Diagnosis On Cell Block. (n=50)

Only Positive (42) and Suspicious(08) samples are processed on cell block. Negative samples are not processed. Hence , total 50 samples processed on cell block.

Serial No.	Diagnosis on cell block.	No.Of Cases	Percentage (%)
1	Positive For Malignancy(PFM)	48	96%
2	Suspicious For Malignancy(SFM)	00	00
3	Negative For Malignancy(NFM)	02	4%
Total		**50**	**100%**

Above table shows out of 50 sample processed on cell block, there are 48 (96%) samples diagnosed as Positive For Malignancy (PFM) ,followed by 02 (4%) samples are Negative For malignancy (NFM) .
2 samples which are Positive For Malignancy (PFM) on conventional smear found to be Negative For Malignancy (NFM).

Graph 2: Showing Diagnosis On Cell Block (n=50).

Table no: 3 Comparison between conventional smear and cell block, And Additional Yield Of Malignancy by cell block method (n=50).

Sr. No	Diagnosis	Conventional Smear		**Cell Block**			
		Positive	(%)	**Positive**	(%)	**Negative**	(%)
1	Positive For Malignancy(PFM)	42	84%	**40**	80%	**02**	4%
2	Suspicious For Malignancy(SFM)	08	16%	**08**	16%	00	00
	Total	50	100%	**Total Cases 50 (100%)**			

Above table shows that, out of 50 samples processed on both conventional smear and cell block, 48 (96%) samples are Positive for Malignancy on cell block compared to conventional smear by which 42 (84%) samples are Positive for Malignancy.

Hence, there is additional **6**cases **(12%)** yield of malignancy by cell block method.

2 (4%)cases that are Positive For Malignancy(PFM) on conventional smear found to be Negative For Malignancy(NFM) on Cell Block , this is due to presence of atypical mesothelial cell that are misdiagnosed as malignant cell on conventional smear.

Sensitivity of cell block found to be- **96%**.

Specificity of cell block found to be-92.59%.

VII.   Discussion

1)   Comparative study of   Sensitivity of cell Block in diagnosis of malignant cases found in studies.

Sr. No	Authors.	Sensitivity.
1	Nithyananda et al [26] 2000	89.4%
2	Present Study	96%.

In study done by Nithyananda et al[15] 2000, found sensitivity of cell block was 89.4%.

In our study we found sensitivity of cell block method is 96%.

VIII.   Conclusion

1) Cell block technique by using 10% alcohol- formalin as afixative is simple, inexpensive and does not require special training and instrument.
2) Morphological feature are better appreciated by cell block method as compared with conventional smear.
3) Multiple sections can be obtained if required for special stain and immunohistochemistry (IHC) studies.
4) Sensitivity of malignant cases by cell block method was significantly increased as compared with conventional smear method.
5) With increasing prevalence of smoking , lung cancer has reached epidemic proportions.
6) In addition to smoking , occupational exposure to carcinogens , indoor air pollution and dietary factors has presently implicated in causation of lung malignancy.
7) Various modalities for early detection through screening are being investigated. Majority of patients have locally advanced or disseminated disease at presentation and are not candidates for surgery.
8) Chemotherapy applied as an adjuvant with radiation improves survival and quality of life hence appropriate histological diagnosis is needed for proper treatment.
9) New anticancer drugs ,which have emerged during the last decade , have shown an improved efficacy in treatment of lung malignancy.
10) In view of our large population ,the burden of lung cancer will be quit enormous in India.
11) Drastic measures aimed at discouraging people from smoking must be taken to reduce the morbidity and mortality due to lung malignancy.

Bibliography

[1].   Kumar , Abbas, Aster. Pathological Basis of Disease vol. 2, 9[th]ed. Elsevier, Reed Elsevier India Private Limited ; 2014. P.712.
[2].   Vincent T. Devita,jr, Theodore S.Lawrence, Steven A.Rosenberg.Cancer-Principle and Practice of oncology, 9[th]ed.WoltersKluer Health,Lippincot Williams And Wilkins, Philadelphia 2011. P.799.
[3].   National Cancer Registry Programme.An epidemiological study.Indian council of medical Reaserch, Biennial Report 1988-1989,New Delhi.P.3-42.
[4].   Behera D, Kashyap S. Pattern of malignancy in a north Indian Hospital. J Indian Med Assoc 1988;86:28-29
[5].   Globocan 2008, Medicine Update 2012, vol. 22 , P. 403.
[6].   Kumar , Abbas, Aster. Pathological Basis of Disease vol. 2, 9[th]ed. Elsevier, Reed Elsevier India Private Limited ; 2014. P.715.
[7].   Lung Cancer Focus: India,www.siroclinpharn.com
[8].   Takagi F. Studies on tumor cells in serous effusions. Am J Clin Pathol.1954;24:663-75.
[9].   VeliosF,Griffin J. Examination of body fluids for tumor cells Am.J.Clin.Pathol.1954:24:676-681.
[10].   Khan N, Sherwani K R, Afroz N, Kapoor S. Usefulness of Cell Blocksversus Smears in Malignant Effusion Cases. Journal of Cytology.2006;23(3):129-32.
[11].   Light RW, Fauci, Braunwald, Kasper, Longo H, Jameson et al. Disorders ofthe Pleura and Mediastinum. In: Harrison's Principle of Internal Medicine.17thed. New York: McGraw Hill; 2008. p. 1658-75.
[12].   Light RW, Macgregor I, Luchsinger PC. Pleural effusions; The DiagnosticSeparation of Transudates and Exudates. Annals of Internal Medicine1972;77:507-13.
[13].   Kanhouwa S B, Mary M. Reliability of Cytologic Typing of Lung Cancer. Acta cytol.1975;20(3):229-32.
[14].   Dekker A, Bupp PA. Cytology of serous effusions.An investigation in to theUsefulness of Cell Block versus Smears. Am J ClinPathol .1978;70:855-60.
[15].   Nathan HA, Narayan E, Smith MM, Horn MJ. Cell Block Cytology.ImprovedPreparation and its Efficacy in Diagnostic Cytology. Am J ClinPathol.2000;114:599-606.
[16].   Sujathan, Kannan, Mathew A, PillaiChandralekha B, Nair MK. Cytodiagnosisof Serous Effusions: Combined Approach to MorphologicalFeatures in Papanicolaou and May-Grunwald MGG Stained Smears and aModified Cell Block Technique. Journal of Cytology.2000;17(2):89-95.

[17]. Narayan E, Nathan HA,Smith MM, Horn MJ. Cell Block Cytology.ImprovedPreparation and its Efficacy in Diagnostic Cytology. Am J ClinPathol.2000;114:599-606.
[18]. Bodele AK, Parate SN, Wdadekar AA, Bhohate SK, Munshi MM. DiagnosticUtility of Cell Block Preparation in Reporting of Fluid Cytology. Journal ofCytology.2003;20(3):133-5.
[19]. Kulkarni, SB Desai, RF Chinoy.Utility of thromboplastin-plasma cell blocktechnique for fine needle aspiration and serous effusions. Diag Cytopathol.2009;37(2):86-90.
[20]. Thapar M, Mishra RK, Sharma A, GoyalV.Critical analysis of cell blockversus smear examinations in Effusions.Journal of Cytology.2010;26(2):60-4.
[21]. UdasimathShivkumarswamy,SurekhaU.Arakeri, Mahesh H.Karigowdar, BR Yelikar. Journal of cytology; J Cytol.2012;29(1):11-15
[22]. Shobha SN, Kodandaswamy CR, IJHSR, vol.3;Issue 1; January 2013.(www.ijhsr.com).
[23]. ArchanaJoshi, NidhiMahajan, Kramakar.P.J, Mahore.S.D. IOSR-JDMS, Volume 13, issue 1 Ver.V.(Jan.2014). PP13-18(www.iosrjournals.org).
[24]. BhavnaGrandhi, VissaShanthi, Mohan Rao N, Chidananda Reddy V, VenkataMurali Mohan K.Int J Res Health Sci. 2014;3(2):278-284.
[25]. RichaNathani, Rakesh Singh Hazari, YogeshG.Patle, Santosh Gupta. International Journal Of Recent Trends in science and Technology August 2014:12(1):69-72.(www.statperson.com)