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## Research Output of some Selected Indian Medical Research Institutions (2007-2011)

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## **Research Output of some Selected Indian Medical Research Institutions (2007-2011)**

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### **ABSTRACT**

Research is the backbone of any subject field, not just required to be undertaken for its survival and sustenance but also for the furtherance of subject scope. Most of the research activities undertaken at any level are aimed towards the welfare and betterment of living being and humans being the first consideration. Medical research has always been the supreme fantasy of humans as it has got direct bearing upon human health and longevity of life. In the present study attempt has been made to have an analysis of medical literature produced in four most primer medical and research institutions of India. To undertake the study, data was retrieved from Web of Science, Thomson Reuters on November 08, 2012 and the analysis is being undertaken on those publications only identified on this particular databank. The study is undertaken with the view to assess the general publication trend of medical sciences in India by undertaking four primer medical institutions under study. Study of the related literature has also been undertaken so as to develop better understanding of the concept and thereby help in the furtherance of its scope.

**KEY WORDS:** Medical Research, Research Output, Bibliometrics, India, AIIMS, JIPMER, PGIMER, SGPGIMS

### **INTRODUCTION**

Excellence in medical sciences has always been the bone of contention in developed world. The developed countries across the world if are seen as progressive, developed and advanced, medical excellence in that very particular country had always been one of

the parameters. Even today more the country is well off at the medical facility front more the country is rated as developed. Even we should not forget that length of human life in a particular country is always taken into consideration to determine the medical sector of that country. Among so many things either directly or indirectly related with humans on health front is actually based on the amount of medical research undertaken in a particular country. More robust the health sector of a country more progressive the nation is.

With the similar view, Indian health sector has improved considerably during the last two decades; even Indian health sector is being seen as second to none across the globe. The biggest advantage which makes people to look at the Indian medical facility is of its being cheap and world class. People all across the South Asia, if have to opt for advanced medical facility, their preferred destination is India for aforesaid reasons and if we have to owe it to something it is medical research carried out in primer medical institutions across the country.

In the present study only five primer medical research institutions namely, all India Institute of Medical Sciences (AIIMS), New Delhi, Jawaharlal Nehru Institute of Postgraduate Medical Education & Research (JIPMER), Pondicherry. Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh and Sanjay Gandhi Post Graduate Institute of Medical Sciences (SGPGIMS), Lucknow has been selected. The data retrieved for analysis is for only five years, i.e from 2007 to 2011 covering following 89 (eighty nine) subject areas. The data has been taken from single third party source.

S.No	Subject Area	S.No	Subject Area
1	ACOUSTICS	45	MICROBIOLOGY
2	ALLERGY	46	MICROSCOPY
3	ANATOMY MORPHOLOGY	47	MYCOLOGY
4	ANESTHESIOLOGY	48	NEUROSCIENCES NEUROLOGY
5	ANTHROPOLOGY	49	NUCLEAR SCIENCE TECHNOLOGY
6	AUDIOLOGY SPEECH LANGUAGE PATHOLOGY	50	NURSING
7	BEHAVIORAL SCIENCES	51	NUTRITION DIETETICS
8	BIOCHEMISTRY MOLECULAR BIOLOGY	52	OBSTETRICS GYNECOLOGY
9	BIOMEDICAL SOCIAL SCIENCES	53	ONCOLOGY

10	BIOPHYSICS	54	OPERATIONS RESEARCH MANAGEMENT SCIENCE
11	BIOTECHNOLOGY APPLIED MICROBIOLOGY	55	OPHTHALMOLOGY
12	CARDIOVASCULAR SYSTEM CARDIOLOGY	56	OPTICS
13	CELL BIOLOGY	57	ORTHOPEDECS
14	CHEMISTRY	58	OTORHINOLARYNGOLOGY
15	COMPUTER SCIENCE	59	PARASITOLOGY
16	CRYSTALLOGRAPHY	60	PATHOLOGY
17	DENTISTRY ORAL SURGERY MEDICINE	61	PEDIATRICS
18	DERMATOLOGY	62	PHARMACOLOGY PHARMACY
19	DEVELOPMENTAL BIOLOGY	63	PHYSICS
20	EDUCATION EDUCATIONAL RESEARCH	64	PHYSIOLOGY
21	ELECTROCHEMISTRY	65	PLANT SCIENCES
22	EMERGENCY MEDICINE	66	POLYMER SCIENCE
23	ENDOCRINOLOGY METABOLISM	67	PSYCHIATRY
24	ENGINEERING	68	PSYCHOLOGY
25	ENVIRONMENTAL SCIENCES ECOLOGY	69	PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH
26	EVOLUTIONARY BIOLOGY	70	RADIOLOGY NUCLEAR MEDICINE MEDICAL IMAGING
27	FOOD SCIENCE TECHNOLOGY	71	REHABILITATION
28	GASTROENTEROLOGY HEPATOLOGY	72	REPRODUCTIVE BIOLOGY
29	GENERAL INTERNAL MEDICINE	73	RESEARCH EXPERIMENTAL MEDICINE
30	GENETICS HEREDITY	74	RESPIRATORY SYSTEM
31	GERIATRICS GERONTOLOGY	75	RHEUMATOLOGY
32	GOVERNMENT LAW	76	SCIENCE TECHNOLOGY OTHER TOPICS
33	HEALTH CARE SCIENCES SERVICES	77	SOCIAL SCIENCES OTHER TOPICS
34	HEMATOLOGY	78	SPECTROSCOPY
35	IMMUNOLOGY	79	SPORT SCIENCES
36	INFECTIOUS DISEASES	80	SUBSTANCE ABUSE

37	INSTRUMENTS INSTRUMENTATION	81	SURGERY
38	INTEGRATIVE COMPLEMENTARY MEDICINE	82	TOXICOLOGY
39	LEGAL MEDICINE	83	TRANSPLANTATION
40	LIFE SCIENCES BIOMEDICINE OTHER TOPICS	84	TRANSPORTATION
41	MATERIALS SCIENCE	85	TROPICAL MEDICINE
42	MATHEMATICAL COMPUTATIONAL BIOLOGY	86	UROLOGY NEPHROLOGY
43	MATHEMATICS	87	VETERINARY SCIENCES
44	MEDICAL LABORATORY TECHNOLOGY	88	VIROLOGY
		89	ZOOLOGY

The study revolves round the aforementioned subject areas as these were found the areas common among all the four institutes. The bibliometric analysis of the data retrieved has been formulated in accordance to objectives set for the study. This study is totally confined to the data accessed from the Web of Science, Thomson Reuters and no inferences have been drawn so as to maintain total objectivity of the study. The major limitation of the study is that data retrieved is not in consonance with the research institutions under study and is merely a collection from the third party as such possibility of various such publications not covered by this particular database is very much there. This as a matter of fact does not mean that this is the total number of publications, published by any of the institutions under study during a particular year and there may be various other publications which may not have been covered by this databank. While as to serve the purpose of the present study vis-à-vis to assess the overall trend of research growth in medical institutes, the data retrieved will surely serve the purpose.

## **RELATED LITERATURE**

A good number of studies have already been undertaken in the field of research evaluation, commonly known as bibliometric studies. Bibliometrics studies have always been undertaken to assess the growth of research publications in a particular discipline by means of bibliometric indicator, a simple substitute of publication count (Martin 1996). Bibliometric studies undertaken have got greater bearing in ascertaining the overall research output or growth in the research activity undertaken at global or regional level. In order to study the subject areas minutely most of the time researchers undertake such studies at institutional level so as to assess the growth and trend of research output in that very particular institution. When taken together these small but vital studies, helps one to

draw the assessment and better understanding of research output in a particular discipline, both at national and global level.

In order to get better insight of research productivity in the field of medicine, bibliometric or other sociometric studies have been undertaken from time to time all across the globe. A study on Primary Health Care in Australia observed that compared to 1990-1999 general practice publications increased from 1.0 to 3.0 publications per 1000 from during 2000-2007(Askew et al. 2008). Cloft, H.J., et al in its survey of Medline publications for the period 1992-1999 observed that only in few or minority of cases pilot reports are followed by more definitive publications(Cloft et al. 2001). The researchers observed that only 27% pilot studies were followed up by more definitive publication within seven years of initial publication. In a study carried out by Lowcay, B., et al. in 2004 for the period 1990-1999 on General Practice Evaluation Program (GPEP) on 99 funded projects and observed that 201 peer reviewed articles were published in 64 Australian and international journals with on average 2.3 articles per completed or in progress project with the suggestion that Australian general practice research should still improve(Lowcay et al. 2004). A similar study carried out in U.K to measure the out of medical research by Wakeford, R, and R. Adams in 1984 for the period 1973-81 by using computerized database Excerpta Medical and observed a mixed response on both increase and decrease of medical research output even among primer research institutions in the field of medicine(Wakeford and Adams 1984).

A study carried out on research output from India during 2001-2008 by Dandona, L., et al. in 2009 undertaking study on PubMed publications and observed that research output from India in PubMed doubled from 4494 to 9066 publication from 2002 to 2007 covering various subject areas with some improper distribution and suffering at some quality parameters(Dandona et al. 2009). Another study carried out by Dandona, L., et al. in 2004 tried to draw comparison between Australia and India towards the amount of research output published during a particular period in both the countries in PubMed. In 2002 from India 4876 papers were published on health which included 48.4% on basic health sciences, 47.1% on clinical health and 4.4% on public health sciences which on comparison with Australian research output was very low, even in those areas where Indian population is more vulnerable to diseases(Dandona et al. 2004). Gagnon, R.E, et al. conducted study on Canadian contribution to medical research entries MEDLARS during the period 1989 to 1998 and the researchers observed that Canadian contribution to world medical literature was three times more than that of average world contribution which as result put the country on global map of its schools being more productive, making contributions to medical sciences(Gagnon et al. 2000).

The bibliometric study undertaken by Kumbar et al, during 1996-2006 by evaluating and analyzing the Scopus database observed that on research publications in the field of

science and technology at the University of Mysore on average grew at the rate of 23% per annum. The study was undertaken on 1518 research publications(Kumbar et al. 2008). Similarly Garg and Rag undertook the study spanning through the period of 1965-82 in the field of science where physics research was analyzed, published in both SCI and non SCI journals(Garg and Rag 1988). This study was equally a bibliometric study to assess the growth in research productivity in various areas of physics with the observation that manpower and research output are interdependent and interrelated to each other.

Koganuramath, et al, in their study undertaken in the Tata Institute of Social Sciences analyzed 663 research publications, published during the period 1990-2000(Koganuramah et al. 2002). The study was primarily aimed to give a grasping over the bibliometric growth of research publications where scientists were more conscious of publishing their research results in more reputed journals. The importance of the bibliometric studies is also important from the view that it helps to sustain the research growth. What is more important about bibliometric studies is they help as a benchmark already set with defined objectives to give more research produce this year from the corresponding year. Moed, et al. were of the view that these studies act as monitoring devices and as a result help in setting the objectives for institutions and in framing future policies of an institution(Moed et al. 1985).

Another study based on the extracts of Scopus undertaken by Vasishta for the period 1996 to 2009 analyzed 177 research publications for PEC University of Technology; Chandigarh observed that there is steady growth in the research output of the university from year after year(Vasishta 2011). In a similar study undertaken by Singh et al. evaluated the data of Science citation Index, wherein the study was undertaken on 901 research publication spread over the period 1993-2001 observed that most of research work was undertaken in the field of Mathematics, Biology, and Clinical Medicine(Singh et al. 2005).

The important aspect of the most of the research works undertaken in the field of sciences is the collaborative authorship what we commonly known as joint authorship, observed Sharma in his study while analyzing 2603 research publications, published between 1991-2007 of Central Potato Research Institute(Sharma 2009).

On the whole we can see people have undertaken bibliometric studies for different reasons but most of the studies end up with that these studies are important from various angles, be it about the assessment of the strengths and weaknesses of a research institution or in setting benchmarks for other institutions. Setting objectives, defining future strategy or policy of an institution and the requirements to fulfill those objectives

are great deal helped by the net research output of the institution which again heavily relies on bibliometric studies undertaken by institutions from time to time.

## **OBJECTIVES OF THE STUDY**

The present study has been undertaken with the following objectives

- To find and understand the research productivity of Indian Medical Research Institutions.
- To assess the growth of medical literature during the last five years.
- Subject areas covered mostly in Indian Medical Research
- Major contributors to Medical Research in India
- To analyze frequency distribution of medical literature in India.

## **SOURCE & METHODOLOGY**

To carry out the present study, services of Web of Science, Thomson Reuters were used. The statistical database uploaded and readily available at the website of said databank was retrieved on November 08, 2012. The database covered 89 medical subject areas of research and practice spanning through four different medical and research institutions of India. From the scope point of view it is to maintain that study is confined to four institutions under study, however the aim of the study is to show the overall bibliometric trend of research publications in the field of medical sciences in India. It is to mention that in this study we have undertaken only those publications which could be retrieved from the aforesaid databank and this does not necessarily mean that this is the actual produce of publications in these institutions during the period of study. There is every possibility that there may also be some additional publications which may not have been covered in the said database, which in turn can also be termed as one of the prime limitations of the study. The data retrieved from the databank was put to excel format for better analysis and understanding to achieve the set objectives.

## **DATA ANALYSIS**

For executing common operation like, addition, subtraction, drawing percentage etc. data analysis of the present study has been undertaken mostly by putting data to excel format and in all cases the percentage has been drawn up to the two decimal places only.

**Table-I Total Five Years Publications**

<b>Years</b>	<b>AIIMS, New Delhi</b>	<b>JIPMER, Pondicherry</b>	<b>PGIMER, Chandigarh</b>	<b>SGPGIMS- Lucknow</b>	<b>Total Publications</b>
2007	899	72	421	227	1619
2008	1088	107	509	291	1995



2009	1058	99	489	223	1869
2010	1127	98	547	213	1985
2011	1012	96	515	205	1828
Total Publications	5184	472	2481	1159	9296

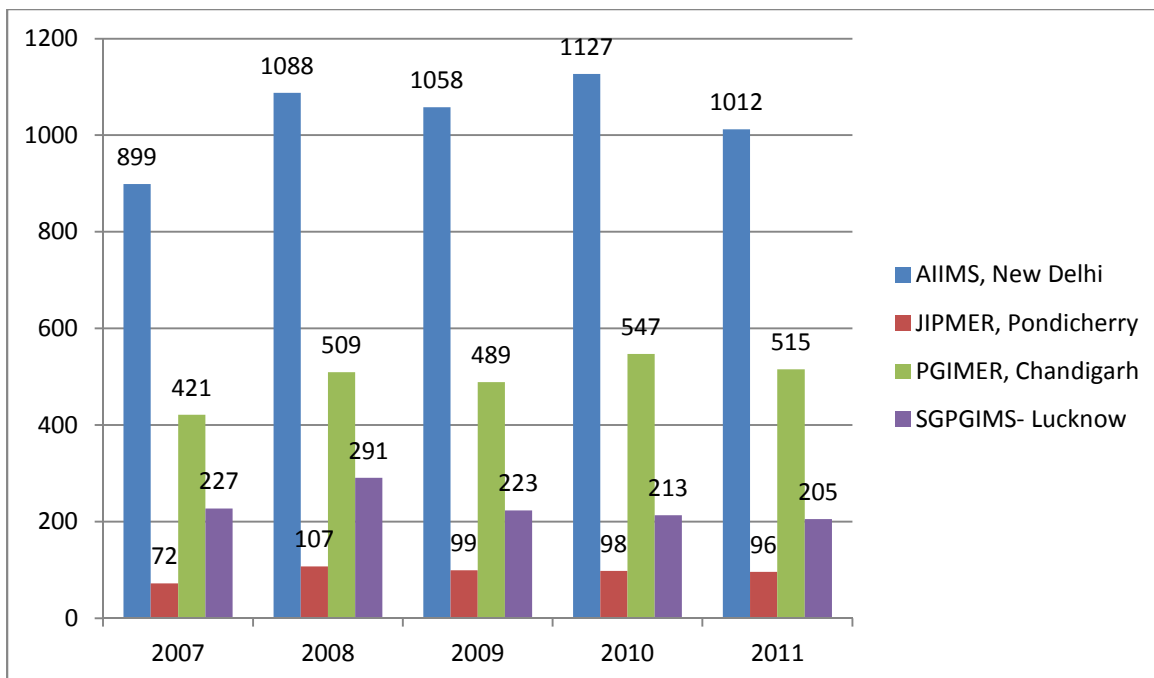


Figure 1

In the above tabulation the attempt was made to segregate the year wise publication distribution of among four aforementioned institutions of medical science and research during the last five years viz. from year 2007 to 2011. In the tabulation and represented by bars in its graphical presentation we can see AIIMS, New Delhi leads the overall tally with its gross publications of 5184, published in almost all 89 subject areas during the period. PGIMER, Chandigarh ranks 2<sup>nd</sup> with its total publication contribution of 2481, followed by SGPGIMS, Lucknow with 1159 publications and lastly JIPMER, Pondicherry 472 publications the lowest among four. Even if we see figures during the individual years AIIMS, New Delhi emerges top contributor throughout the period, followed by PGIMER, Chandigarh, SGPGIMS Luknow and JIPMER, Pondicherry, all had been steady in their contribution during the years of analysis, though we can observe slight increase and decrease in publication form year to year in each institution.

**Table-II Year wise of research output with %age increase**

Years	2007	2008	2009	2010	2011
Overall growth with %age increase	1619 (0.00)	3614 (123.22)	5483 (51.71)	7468 (36.20)	9296 (24.47)

(Figures in the parenthesis indicate percentage)

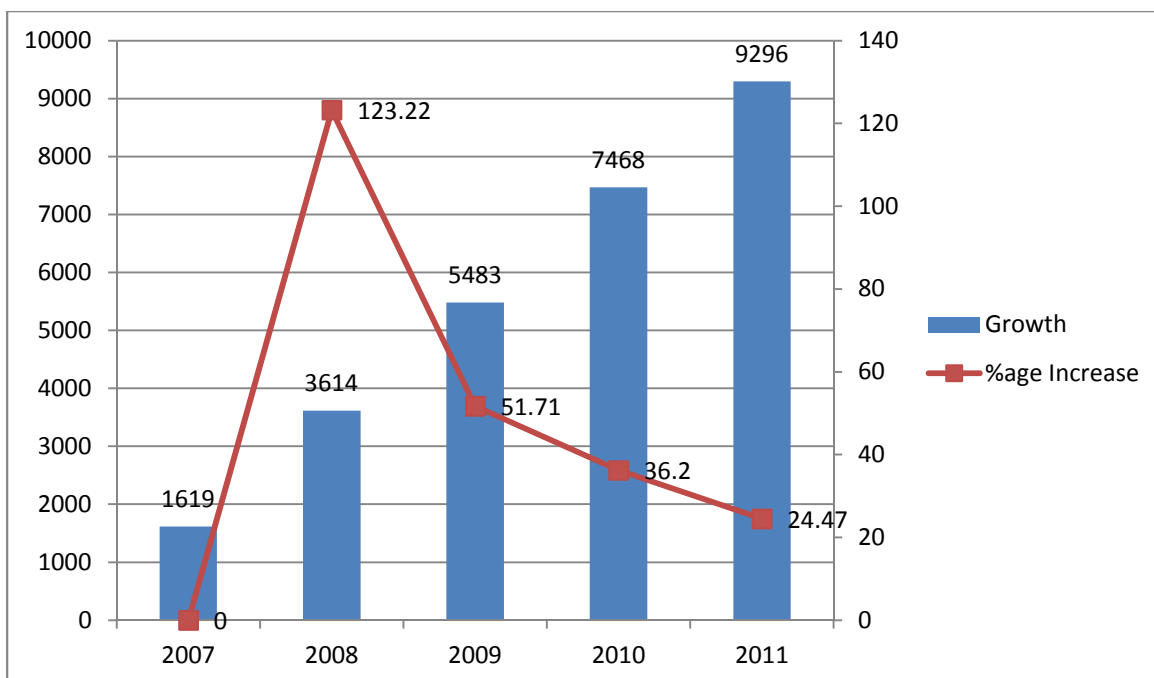


Figure 2

In the above tabulation attempt was made to assess the overall growth of medical research publication form the period 2007 to 2011. In the tabulated figures we can see the number of publication in the year 2008 increased to 3614 from 1619 during the corresponding year in 2007. Accordingly the number grew to 5483 in 2009, 7468 in 2010 and 9296 in 2011. From the bar graph and percentage increase curve we can see the maximum percentage increase was recorded in the year 2008 when the publications grew by 123.22% highest during the entire period. Similarly in the year 2009 51.71% growth was recorded which declined to 36.20% in 2010 and reached to 24.47% during 2011. If we go by the %age increase curve we can see the trend is towards the decline in the percentage increase while as on the whole the publications on average annually grew at the rate of 58.90% which is quite encouraging.

**Table-III Year wise distribution of research output with %age increase or decrease**

Years	2007	2008	2009	2010	2011
Total Publications with %age increase or decrease	1619 (0.00)	1995 (23.22)	1869 (-6.31)	1985 (6.20)	1828 (-7.90)

(Figures in the parenthesis indicate percentage)

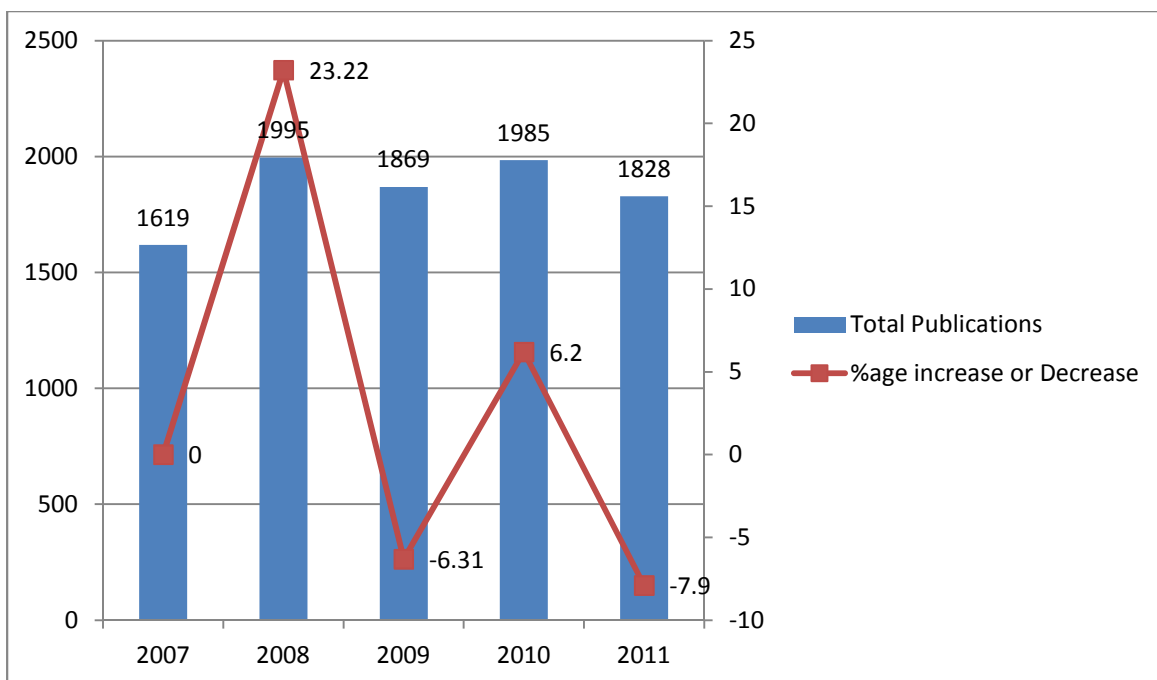


Figure 3

The above tabulation was drawn with the view to assess the overall increase or decrease in publication growth in comparison to publication published during the corresponding year. In the analysis it was observed that among the four institutions under study during the year 2008 an increase of 23.22% in publications was observed over that of number of publications during the year 2007. Accordingly in year 2009 slight decrease of -6.31% was observed in comparison with the publication of the corresponding year. In the year 2010 an increase of 116 publications was recorded which again showed positive growth of 6.20% from the corresponding year. The same positive momentum could not be maintained during the year 2011 in which again negative growth was recorded -7.90. from the graphical presentation we can also see how the percentage curve drawn against secondary axis moves up and down, as it moves from one bar to another. In all, maximum number of publications were recorded during the year 2008 numbering 1995, followed by 1985 publication during the year 2010. Year 2009 ranks at 3<sup>rd</sup> spot with overall 1869 publications published in different subject areas. With 1828 publication in the 2011 and 1619 publication in the year 2007 as such remained at 4<sup>th</sup> and 5<sup>th</sup> rank respectively.

**Table-IV: %age increase or decrease in publications during the corresponding year**

Year/Institute	2007	2008	2009	2010	2011
<b>AIIMS, New Delhi</b>	899 (0.00)	1088 (21.02)	1058 (-2.75)	1127 (6.52)	1012 (-10.20)
<b>JIPMER, Pondicherry</b>	72 (0.00)	107 (48.61)	99 (-7.47)	98 (-1.01)	96 (-2.04)
<b>PGIMER,</b>	421	509	489	547	515

<b>Chandigarh</b>	(0.00)	(20.90)	(-3.92)	(11.86)	(-5.85)
<b>SGPGIMS- Lucknow</b>	227	291	223	213	205
	(0.00)	(28.19)	(-23.36)	(-4.48)	(-3.75)

(Figures in the parenthesis indicate percentage)

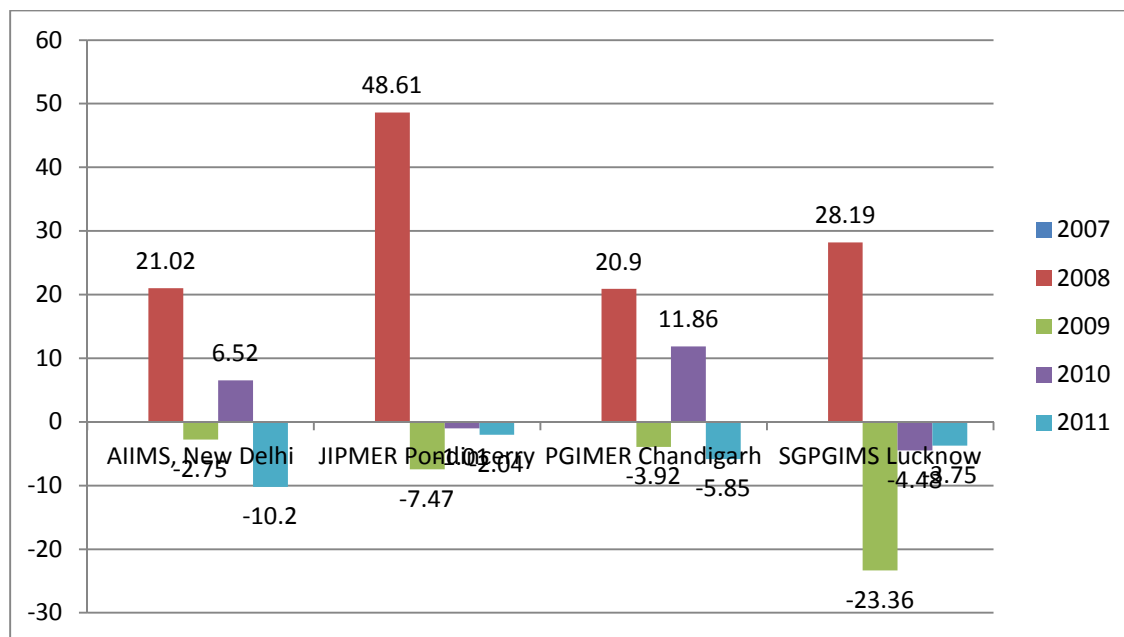


Figure 4

Table –IV was drawn with the view to have better and broader understanding about the growth of research publications in each institution by comparing the figures with corresponding year. AIIMS, New Delhi during the year 2008 showed convincing growth of 21.02% which during the year 2009 could not be maintained with the same momentum and as a result declined to -2.75%. However during the year 2010 the institute showed signs of recovery with the observation of 6.25% positive growth which again in the year 2011 declined to -10.20%. JIPMER, Pondicherry improved by 48.61% during the year 2008 but declined by -7.47% during the year 2009 which remained continue thereafter in the year 2010 and 2011 showing negative growth of -1.01% and -2.04% respectively. PGIMER, Chandigarh grew by 20.90% during 2008 and receded by -3.92% during the year 2009. The institute showed some recovery in 2010 by showing growth of 11.86% but couldn't sustain it during 2011 and as result dropped by -5.85%. SGPGIMS, Lucknow showed a growth of 28.91% while as in the 2009 same declined by -23.36% which continued during the year 2010 and 2011 when the publications dropped by -4.48% and -3.75% respectively.

**Table-V Publications Percentage share among four institutions**

Years	AIIMS, New Delhi	JIPMER, Pondicherry	PGIMER, Chandigarh	SGPGIMS- Lucknow
Total Publications with %age share	5184 (55.76)	472 (5.07)	2481 (26.68)	1159 (12.50)

(Figures in the parenthesis indicate percentage)

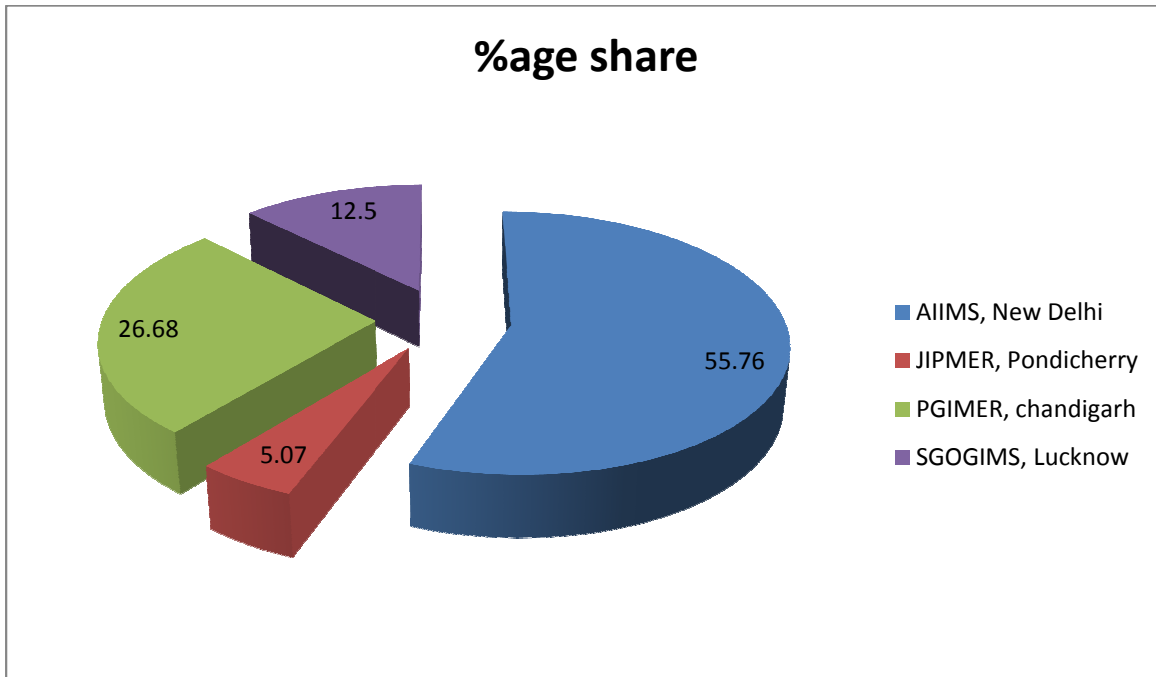


Figure 5

In Table-V attempt was made to assess the overall publication contribution of individual institutions during the period 2007 to 2011. Among the four major institutions AIIMS, New Delhi emerged the major contributor in medical research publication which had 55.78% publication to its credit, PGIMER, Chandigarh ranks 2<sup>nd</sup> with its share of 26.68% publication during the said period. SGPGMS, Lucknow had a share of 12.50% and lastly JIPMER, Pondicherry had 5.07% publications to its credit.

Table –VI Top 10 Research Subjects of AIIMS, New Delhi

Research Areas	Publications with %age share
PEDIATRICS	753 (14.53)
NEUROSCIENCES NEUROLOGY	536 (10.34)
ONCOLOGY	452 (8.72)
SURGERY	406 (7.83)
GENERAL INTERNAL MEDICINE	399 (7.70)
IMMUNOLOGY	308 (5.94)
OPHTHALMOLOGY	295 (5.69)
HEMATOLOGY	272 (5.25)
CARDIOVASCULAR SYSTEM CARDIOLOGY	245 (4.73)
UROLOGY NEPHROLOGY	228 (4.40)
Rest of Subjects	1290 (24.88)

(Figures in the parenthesis indicate percentage)

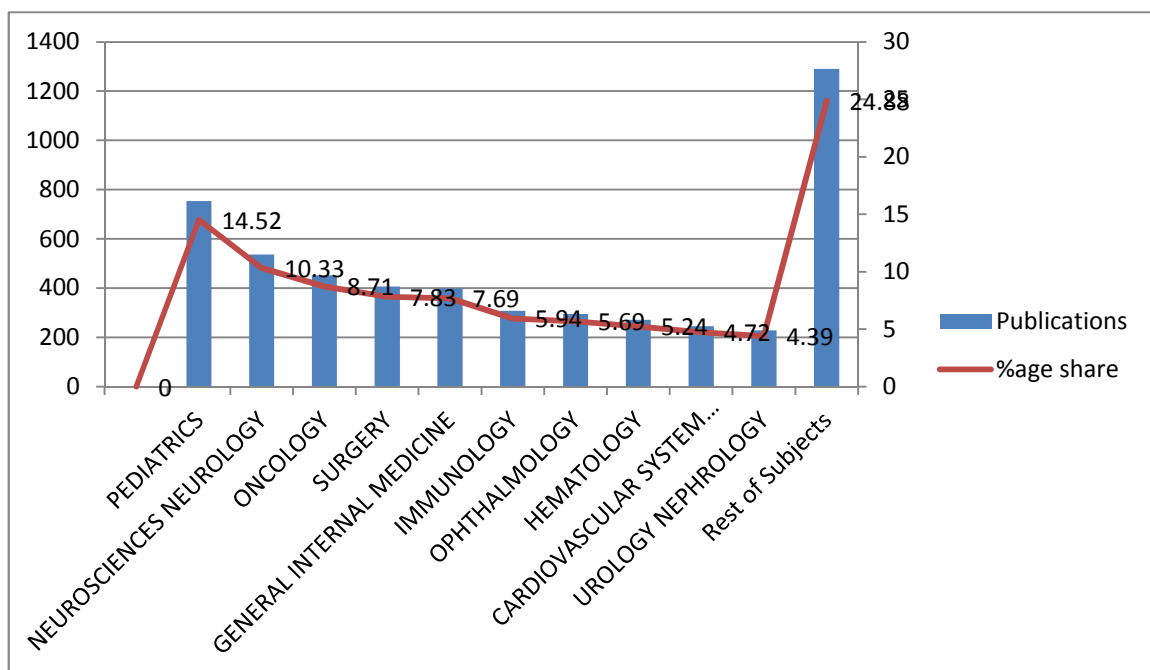


Figure 6

In the above tabulation leading ten research areas of medicine in the AIIMS, New Delhi were identified based on the maximum number of publication contributed to a particular area. From the analysis it Pediatrics emerged top most research area of AIIMS which as many 753 publications credited to, constituting 14.53% of research publication of AIIMS to this particular discipline. Neuroscience and Neurology is the 2<sup>nd</sup> top most discipline in which 536 publications were published by this institute during the five years span spreading from 2007 to 2011, constituting 10.34% share. Oncology ranks at third place with 452 publications, constituting 8.72% share. Accordingly the trend goes down the line where in Urology and Nephrology ranks at 10<sup>th</sup> spot with 228 publications to its credit making it 4.40% share. From the tabulation we can see rest of the areas have got 1290 publications, accounting to 24.88% share which is also commendable. On the whole AIIMS, New Delhi has produced fair amount of literature in all the disciplines, obviously mostly depending upon the thrust areas the institution covers.

**Table –VII Top 10 Research Subjects of PGIMER, Chandigarh**

Research Areas	Publications with %age share
PEDIATRICS	310 (12.49)
GENERAL INTERNAL MEDICINE	241 (9.71)
GASTROENTEROLOGY HEPATOLOGY	208 (8.38)
SURGERY	195 (7.86)
NEUROSCIENCES NEUROLOGY	185 (7.46)
PATHOLOGY	142 (5.72)
DERMATOLOGY	137 (5.52)
ONCOLOGY	120 (4.84)

IMMUNOLOGY	115 (4.64)
CELL BIOLOGY	111 (4.47)
PHARMACOLOGY PHARMACY	111 (4.47)
Rest of the subjects	606 (24.42)

(Figures in the parenthesis indicate percentage)

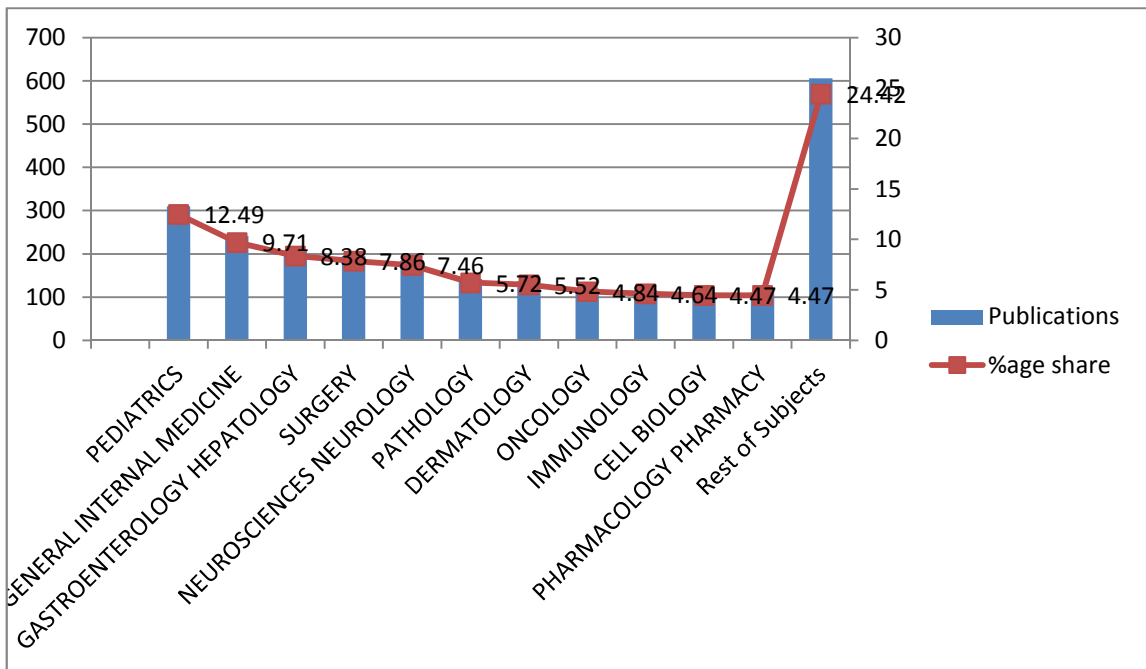


Figure 7

Like Table-VI the above tabulation is intended to assess the top ten research areas in the PGIMER, Chandigarh and as per the figures and the graphical representation we can see Pediatrics is equally the essential area of research in this institution like AIIMS, New Delhi. Pediatrics leads the table tally with 310 publications, constitutions share percentage of 12.49%, which is followed by General Internal Medicine with 241 publications constituting share of 9.71%. Gastroenterology Hepatology ranks 3<sup>rd</sup> by having 208 publications to its credit constituting 8.38% share. The other subject areas covered in this table in hierarchal order includes Surgery, Neurosciences Neurology, Pathology, Dermatology, Oncology, Immunology, Cell Biology and Pharmacology. Rest of the subject areas have got 606 publications to their credit constituting 24.42% share which is almost similar to that of AIIMS, New Delhi.

**Table –VIII Top 10 Research Subjects of SGPIMS, Lucknow**

Research Areas	Publications with %age share
NEUROSCIENCES NEUROLOGY	223 (19.24)
SURGERY	128 (11.04)
GASTROENTEROLOGY HEPATOLOGY	124 (10.69)
ONCOLOGY	84 (7.24)
PEDIATRICS	84 (7.24)

IMMUNOLOGY	75 (6.47)
GENERAL INTERNAL MEDICINE	72 (6.21)
RADIOLOGY NUCLEAR MEDICINE MEDICAL IMAGING	65 (5.60)
GENETICS HEREDITY	60 (5.17)
RHEUMATOLOGY	59 (5.09)
Rest of the subjects	185 (15.96)

(Figures in the parenthesis indicate percentage)

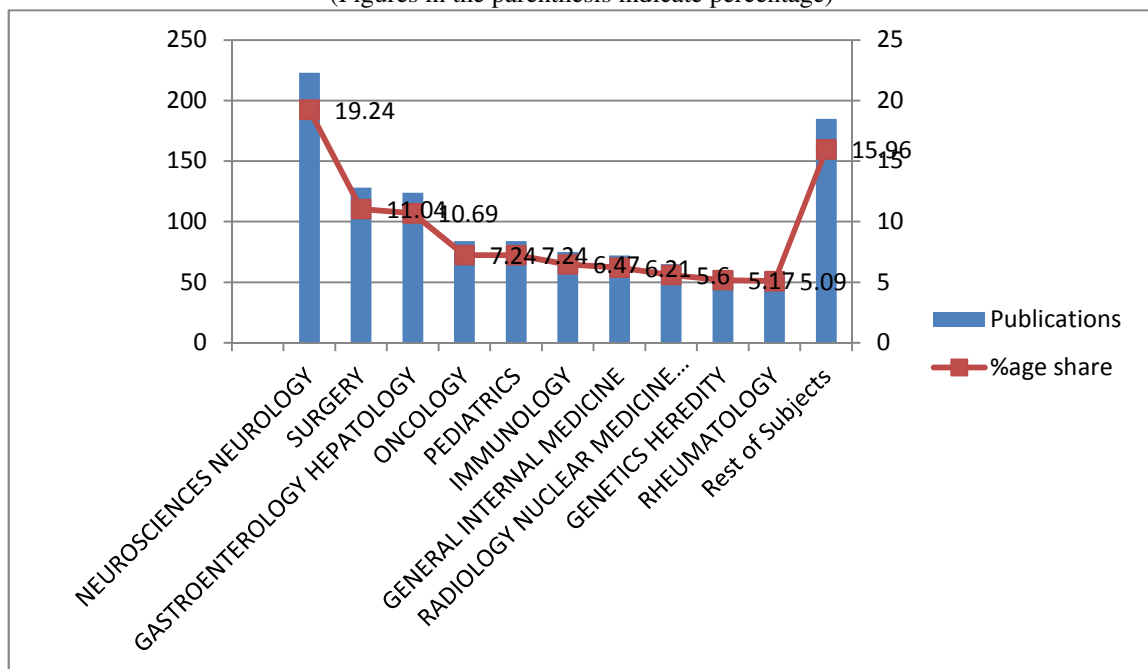


Figure 8

On the similar line table-VIII was drawn to assess the research contribution of SGPIMS, Lucknow in top ten medical disciplines. Unlike AIIMS, New Delhi and PGIMER, Chandigarh, SGPIMS, Lucknow tops the table tally with Neurosciences and Neurology by having maximum publications to its credit, numbering 223, constituting 19.24% of the total share during the period of study. Surgery and Gastroenterology Hepatology ranks at 2<sup>nd</sup> and 3<sup>rd</sup> spot with 128 and 124 publications to their credit constituting 11.04% and 10.69% share respectively. Accordingly down the line Rheumatology is the research area which ranks at number 10 with 59 publications making its total share of 5.09%. Rest of the subject areas are credited with 185 publications constituting 15.96% share.

**Table –IX Top 10 Research Subjects of JIPMER, Pondicherry**

Research Areas	Publications with %age share
DERMATOLOGY	64 (13.56)
PATHOLOGY	50 (10.59)
PEDIATRICS	44 (9.32)
SURGERY	39 (8.26)
PHARMACOLOGY PHARMACY	34 (7.20)



GENERAL INTERNAL MEDICINE	32 (6.78)
CARDIOVASCULAR SYSTEM CARDIOLOGY	30 (6.36)
IMMUNOLOGY	30 (6.36)
RESEARCH EXPERIMENTAL MEDICINE	30 (6.36)
CELL BIOLOGY	26 (5.51)
Rest of the subjects	93 (19.70)

(Figures in the parenthesis indicate percentage)

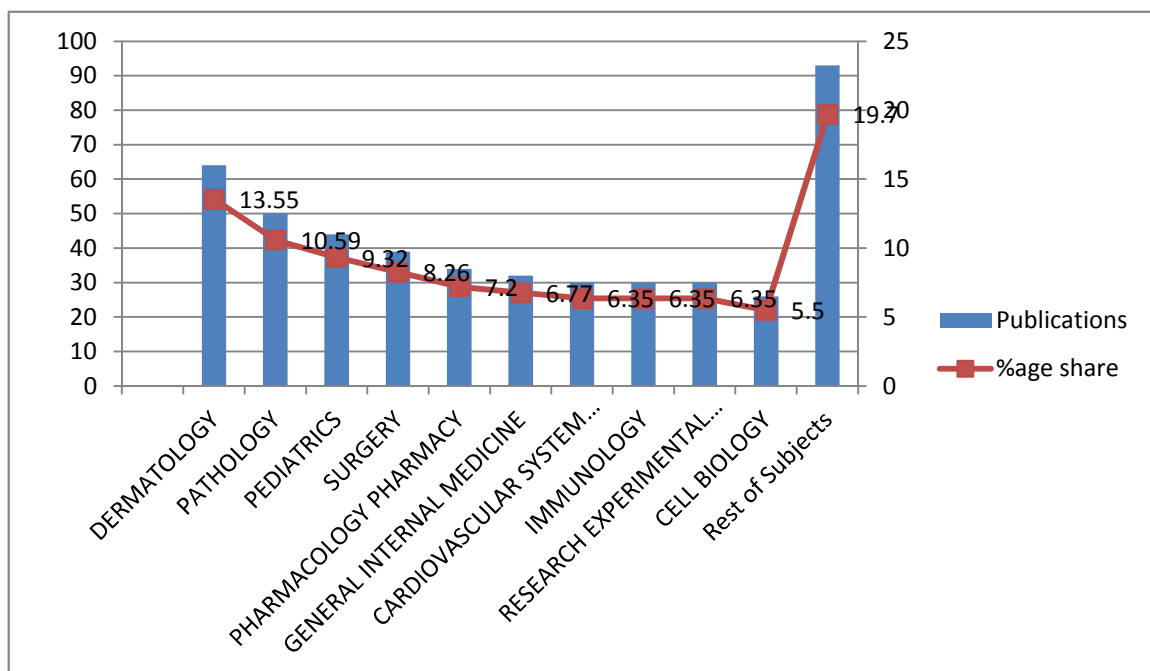


Figure 9

JIPMER, Pondicherry ranks fourth in overall tally of publications contribution, however the top ten research areas evaluated form the said institution as under. Dermatology on the whole emerged the top most discipline with maximum number of publications to its credit numbering 64, constituting 13.56% publication share. Pathology owes 50 publications constituting 10.59% share, this is followed by Pediatrics and Surgery having 44 and 39 publications to their credit and constituting percentage share of 9.23 and 8.26 percent respectively. Accordingly the trend moves down to Cell Biology which has a share of 26 publications during the entire period of study, constituting share percentage of 5.51%. In rest of the subject areas 93 publications have been published constituting 19.70% share percentage.

Table -X Top 05 Research areas in all four institutions.

Name of subject Area	Total number of pubs with %age share
Pediatrics	1191 (12.81)
Neurosciences and Neurology	961 (10.33)
Surgery	768 (8.26)

General Internal Medicine	744 (8.00)
Oncology	669 (7.19)

(Figures in the parenthesis indicate percentage)

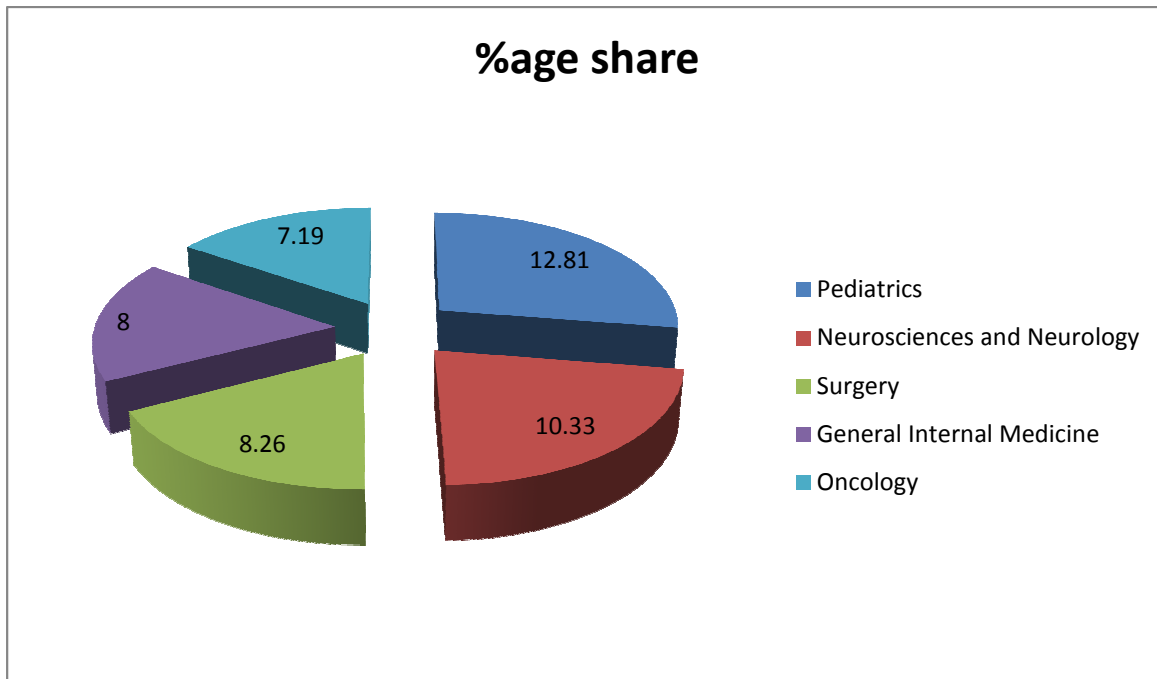


Figure 10

Table-X was drawn to see and assess the overall top five research disciplines among all four primer medical institutions during the period of study. From the tabulated figures and we can see from the pie diagram Pediatrics is the top most research discipline together constituting 1191 publications, constituting 12.81% share. Neuroscience and Neurology emerged the 2<sup>nd</sup> largest research area spreading across all four institutions having in all 961 publications to its credit, constituting 10.33% share. Surgery ranks 3<sup>rd</sup> among the top five research areas undertaken in all four institutes having 768 Publications with percentage share of 8.26%. General Internal Medicine and Oncology ranked at 4<sup>th</sup> and 5<sup>th</sup> place, having 744 and 669 publications to their credit with percentage share of 8.0% and 7.19% respectively.

## CONCLUSION

It is pertinent to say most of the medical research institutions have common subject interests, which as a result helped that very discipline grow considerably compared to other areas which are not common among others. Pediatrics, Neurosciences and Neurology, Surgery, General Internal Medicine and Oncology are the five main research areas in which all the research institutions participated equally, besides, these five areas emerged the most ranked research interests with maximum number of publications to

their credit. On the whole there is steady increase in the research publications in medical sciences having average annual growth of 58.90% which is noteworthy. The research output can be also seen from the point that AIIMS, New Delhi being one of the oldest medical and research institutions makes it to contribute and publish maximum research results. Other institutions can also be seen as contributing significantly mostly depending upon their coming into being.

From the analyzed data we can see that there is not always positive growth in the amount of research publications when weighed with publications of the corresponding year. Even AIIMS, New Delhi showed mixed trend with slight increase and decrease in the publications as we moved from year to year. Other institutions do showed decline in the research publications as we progressed from year to year analysis, which is a bit sign of worry. Over all during the year 2009 and 2011 negative growth was recorded in the research publication among all four institutions when taken together.

On the whole we can see the progressive side of the medical research output, and hope this trend is similar to other medical institutions across the country. Though we have some limitations in analyzing the bibliometric study to its perfection, still we definitely have been left with better and boarder understanding about the trend in research productivity in medical institutions across the country. We do leave here scope for other researchers whereby they can carry forward this study by taking similar analysis with the research publications of other medical institutions across the country.

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