

간염에 대한 국가별 연구패턴과 우선순위의 계량과학적 분석

National Patterns of Research output and Priorities in Hepatitis: a Scientometric Analysis

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초 록

이 연구에서는 MEDLINE과 CINAHL, IPA 등 3개 서지데이터베이스에 수록된 1984년부터 2003년까지 20년간의 문헌을 바탕으로 간염의 하위영역의 국가별 연구패턴과 우선순위에 대한 계량과학적 분석을 시도하였다. 이 연구에서는 연구자들의 간염연구분야의 전반적인 문헌분석에 대한 선행연구를 바탕으로 특히 하위영역에 대한 계량과학적 분석을 시도하였다. 간염분야의 주요 하위영역의 문헌은 23개로 세분되고 있으며, 1984-1993년의 기간중에는 일부 하위영역이 높은 우선순위를 차지하고 있었다. 하위영역의 우선순위가 높은 국가를 분석기간의 전반기와 후반기로 비교해 보면, 전반기(1984-1993)에는 미국(10개하위영역), 영국(9), 독일(8), 캐나다, 러시아, 네덜란드(각각 7) 순이었고, 후반기(1994-2003)에는 독일(10), 영국(9), 미국(8), 캐나다, 러시아, 네덜란드(각각 7) 순이었다.

키 워 드

간염-계량과학적 분석, 간염-국가별 연구패턴, 간염-국가별연구우선순위, MEDLINE, CINAHL, IPA

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ABSTRACT

This paper presents a scientometric analysis of national patterns of research output and priorities in the sub-fields of Hepatitis covered in three bibliographic databases namely MEDLINE, CINAHL and IPA. The literature covered in three databases for the period 1984–2003 was considered. We have already discussed the Trends in the Growth of Literature on Hepatitis in our previous paper. Therefore in this paper only sub-fields analysis is presented. It has been found that the Hepatitis literature output has been grouped in 23 major sub-fields based on databases covered. It was found that there were high priorities for some of the sub-fields of Hepatitis research during 1984–1993. It was found that the research priority profile was more or less homogenous since majority of the sub-fields are showing either below or above average levels of priority profile. In the first phase of the research period covering from 1984–1993, there are high priorities in 10 sub-fields in USA followed by 9 in UK and 8 in Germany, 7 each in Canada, Russia and Netherlands. On the other hand, in the second phase (1994–2003) there are high priorities for 10 sub-fields in Germany, 9 in UK, 8 in USA, 7 each in Canada, Russia and Netherlands. In the productivity of Pediatrics subfield, India is in the third position.

KEYWORDS

Hepatis - Scientometric analysis, Hepatis - National research patterns, Hepatis - Priorities, MEDLINE, CINAHL, IPA

1. Introduction

Science and scientific research have obviously been growing at a faster rate during recent years. Every nation considers scientific and technical development as the basis for its overall progress. Scientometrics investigates quantitative aspects of science; it is the quantitative of the Science of Science, of Scientific Com-

munication Studies and of Science Policy Studies. Scientometrics and Informetrics are bound through their mutual interest in scientific literature. Their statistical and mathematical orientation does not preclude analysis by qualitative methods.

Hepatitis is a disease, which was the first to noted by Hippocrates, the occurrence of jaundice epidemics - the telltale yellowing of the skin that heralds the fact

that the liver can no longer properly cleanse the blood.

In the recent decades clinicians, epidemiologists, microbiologists, pathologists, molecular biologists and other basic scientists all over the world have contributed immensely to the literature on Hepatitis.

This study identifies the National Patterns of Research output and Priorities in the sub-fields of Hepatitis covered in three bibliographic databases namely MEDLINE, CINAHL and IPA. The literature covered in three databases for the period 1984-2003 was considered. We have already discussed the Trends in the Growth of Literature on Hepatitis in our previous paper. It analysed the growth of literature output in the field of hepatitis covered in three bibliographic databases namely MEDLINE, CINAHL and IPA. It has been analysed by using bibliometric indicators such as Relative Growth Rate (RGR) and Doubling Time (Dt). This paper represents a revised part of the doctoral dissertation of the second author.

2. Scope

This study was aimed to examine quan-

tatively the growth of literature in the Subfield of 'Hepatitis' with the help of the source bibliographic databases namely MEDLINE, CINAHL and IPA. The objectives of this paper are to:

- examine the year wise growth of Hepatitis sub-fields literature output,
- analyse the Indian literature on "Sub-fields of Hepatitis"; and
- study the Hepatitis literature output by cross-national comparisons.

3. Literature Review

A large number of studies are being conducted based on sub-fields analysis. It will throw light on the nature, quantum and trends of research in a particular sub-field being undertaken by the researcher in a given country. Todorov(1989) has proposed a new bibliographic method for representing links between sub-fields as defined by a classification scheme which has been applied to describe the internal links with in the field of Condensed Matter Physics using the Physics Abstracts database 1984. The trends in Environmental Science research in India with regard to its various branches, channels of commu-

nications used, authorship pattern, institution wise productivity and collaborative research has been investigated by Karki(1990) covered in the "Paryavaran Abstracts". In order to measure a country's relative specialisation in different scientific fields, Barre(1991) constructed Revealed Scientific Advantages Index, based on the INIST/CNRS PASCAL database classification of science consisting of 107 sub-fields. The publications of Spanish pharmacologists has been analysed by Bordons and Barrigon(1992) based on the citations in SCI for the period 1984-1989. Major findings of the study are increasing trend of the productivity in the sub-fields pharmacy and pharmacology, irregular geographical distribution, high dispersion of publications in journals, high collaboration rate and cross-disciplinary research of Spanish pharmacologists. Karki, Garg, and Sharma(2000) examined the research productivity on Indian Organic Chemistry during the period 1971-1989 using Chemical Abstracts. They attempted to quantify the national contribution to world efforts and identified areas of relative strength and weakness, and also modeled the growth of Indian Organic Chemistry to world Organic Chemistry output as a whole, and

in subfields, where the AI (Activity Index) for the world and India were similar. The publication output of 25 major countries in 10 sub fields of Physics drawn from INSPEC database for the period 1989-1994 were analysed by Nagpaul and Bhattacharya(2000) to study the national patterns of research output and priorities with the help of statistical techniques such as Research Priority Index, Typological Analysis, Multidimensional analysis and Correspondence Analysis, to monitor the changes in the structure of research in Physics.

4. Methodology

The three databases namely MEDLINE (Medical Literature Analysis and Retrieval Systems Online) CD-ROM, CINAHL (Cumulative Index to Nursing and Allied Health Literature) CD-ROM and IPA (International Pharmaceutical Abstract) CD-ROM, for the purpose of data collection on Hepatitis research. The data collected from these databases on the literary production of Hepatitis' for the period 1984-2003 has been analysed by using three bibliometric indicators namely Research

Priority Index (RPI), Cluster Analysis and Multidimensional Scaling (MDS). The analysis is based on the data collected for the doctoral research by the second mentioned author.

4.1 Research Priority Index (RPI)

Research Priority Index is a statistical tool for applying cross-national comparisons. Priority Index (PI) is computed by the following formula

$$PI = \frac{n_{ij}/n_{io}}{n_{oj}/n_{oo}} \times 100$$

whereas

n_{ij} = the number of publications of country i in sub-field j .

n_{io} = the number of publications of country i in all sub-fields.

n_{oj} = the number of publications of all countries in sub-field j , and

n_{oo} = the number of publications of all countries in all sub-fields.

Here all' refers to the comparison set (i.e. the set of major countries). This index is identical to Activity Index proposed by Frame and subsequently used among oth-

ers by Schubert and Braun and Carpenter et al. The value of $PI = 100$ indicates that research priority of a country for a given sub-field corresponds precisely to the average of all countries, i.e. average priority. $PI > 100$ indicates higher than average priority and $PI < 100$, lower than average priority. It should, however, be kept in mind that (by virtue of definition of PI), no country can have high or low priority in all sub-fields. From the values of PI, we can compare:

- i. The priorities of a given country to different sub-fields in a given time span;
- ii. The priorities of different countries to a given sub-field in a given time span;

4.2 Cluster Analysis

The cluster analysis is one such method, which has been adopted in this study to minimize the data into groups/clusters. Cluster Analysis groups highly similar entities and create homogeneous groups of cases or variables. To quote Aldenderfer and Blastifield(1984), "a clustering method is a multivariate statistical procedure that starts with a data set containing in-

formation about a sample of entities and attempts to reorganize these entities into relatively homogenous groups”.

Similarly measures: The “closeness” or “similarity” can be measured on the nature of the variables (Discrete, Continuous, Binary) or scales of measurement (Nominal, Ordinal, Interval, Ratio). Basically the variables cases are clustered on the basis of correlation coefficient or like measures of association or Euclidean distance. Though there are various similarity measures available, Euclidean distance is generally preferred for cluster analysis.

4.3 Multidimensional Scaling (MDS)

Multidimensional Scaling(MDS) is a class of technique, which uses proximities among any kind of objectives as input. A proximity is a number which indicates how similar or how different to objects are, or are perceived to be or any measure of this kind.

MDS is a set of mathematical techniques that enables the researcher to uncover the hidden structure. This technique has been used in disciplines such as Psychology, Sociology, Anthropology, Education, Economics, etc., and currently it

is also been used in the field of Library and Information Science.

5. Limitation

This study is confined to the literature covered in MEDLINE, CINAHL and IPA bibliographic databases for the period 1984–2003. This paper represents a part of the doctoral dissertation of the second author.

6. Analysis and Discussion

We have already discussed the details of growth rate of Hepatitis literature in our previous paper, which was published in the Journal of Korean Library and Information Science Society. So in this paper we discuss only the national patterns of research output and Priorities in Hepatitis output.

6.1 Quantum of Literature Published on Hepatitis During 1984 – 2003

A total of 82,617 records covered in three databases and the duplicate records are about 4% (3,305) of total productivity.

After the elimination of duplicate records, there are 79,312 records in the Hepatitis literature has been presented in <Table 1> according to year of publication. It is found that there is a gradual growth of literature in the subject of study by year after year. The year 2002 has marked a maximum of 7.59% out of total pro-

ductivity in the study period.

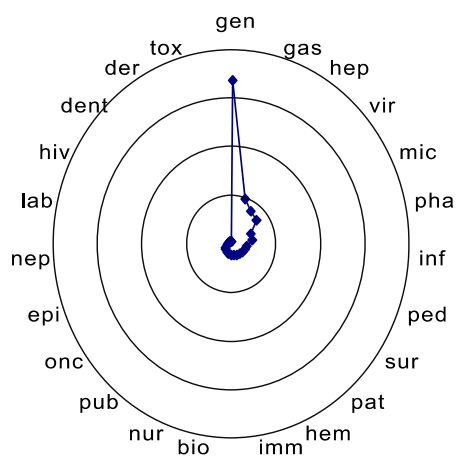
6.2 Quantum of Hepatitis Research Output According to Sub-Fields

It has been found that the Hepatitis literature output has been grouped in 23 major sub-fields based on MeSH (Medical Subject Headings) (<Figure 1>). Therefore the literature has been grouped in those subfields and the data is presented in Table 2. It is observed that about one-third of the literature are covered on “general medicine” followed by “gastroenterology” and “hepatology”.

Further the literature has been grouped among the various countries versus sub-

<Table 1> Quantum of Literature published in Hepatitis by year wise

S.No.	Year	No. of Records	%
1	1984	2538	3.20
2	1985	2516	3.17
3	1986	2566	3.24
4	1987	2715	3.42
5	1988	2679	3.38
6	1989	2993	3.77
7	1990	3382	4.26
8	1991	3543	4.47
9	1992	3919	4.94
10	1993	3976	5.01
11	1994	4084	5.15
12	1995	4584	5.78
13	1996	4311	5.44
14	1997	4458	5.62
15	1998	4697	5.92
16	1999	5083	6.41
17	2000	5440	6.86
18	2001	5560	7.01
19	2002	6019	7.59
20	2003	4249	5.36
Total		79312	100.00



<Figure 1> Rotate graph for the sub-fields of Hepatitis Research

fields and the data is presented in <Table 3>.

The research productivity on “HIV related Hepatitis” is noticed in USA, U.K, Spain and Canada only, which reveals that other countries did not published literature this sub-field.

6.3 Research Priority Index (RPI) for Cross National Comparisons

The Research Priority Index for cross national comparison in the total output of Hepatitis research has been grouped within 23 sub-fields spreading 23 coun-

<Table 2> Quantum of Hepatitis Research output according to Sub-fields

S.No.	Sub-field	Sub-field Code	No. of Contribution	%
1	General medicine	GEN	26770	33.75
2	Gastroenterology	GAS	7701	9.71
3	Hepatology	HEP	6536	8.24
4	Virology	VIR	5754	7.25
5	Microbiology	MIC	3722	4.69
6	Pharmacology	PHA	3384	4.27
7	Infectious diseases	INF	2412	3.04
8	Pediatrics	PED	2394	3.02
9	Surgery	SUR	2264	2.85
10	Pathology	PAT	2095	2.64
11	Hematology	HEM	2041	2.57
12	Immunology	IMM	1797	2.27
13	Biochemistry	BIO	1734	2.19
14	Nursing	NUR	1694	2.14
15	Public health	PUB	1652	2.08
16	Oncology	ONC	1584	2.00
17	Epidemiology	EPI	1322	1.67
18	Nephrology	NEP	1085	1.37
19	Laboratory medicine	LAB	839	1.06
20	HIV	HIV	790	1.00
21	Dentistry	DENT	650	0.82
22	Dermatology	DER	554	0.70
23	Toxicology	TOX	538	0.68
	Total		79312	100.00

(Table 3) Country Vs. Subfield Wise Distribution of Hepatitis Research

COUN	Bio	Dent	Der	Epi	Gas	Gen	Hem	Hep	HIV	Imm	Inf	Lab	Mic	Nep	Nur	Onc	Pat	Ped	Pha	Pub	Sur	Tox	Vir	tot
USA	980	366	222	356	3445	6941	748	2409	508	706	1410	416	1651	308	1193	852	722	1149	1016	758	1575	318	3616	31687
UK	362	114	95	253	502	3114	378	924	263	434	333	32	543	254	355	242	426	193	1146	255	332	57	510	11117
JAP	18	3	24	14	542	2899		12		56	28	102	78		121	32	26	75	4	39	16	37	4226	
GER	105		4	1	254	1388	104	152		169	226	49	230	113	47	174	165	105	16	106	57	5	3470	
FRA	7	27	73	30	812	1106	127	48		15			151	2	9	196	104	24	41	14	11	11	108	2905
NETH	194		12	104	20	467	12	414		140	6		240		48	8		311	11	7	35	582	2611	
RUS	7		3	238	12	1271				24	113	150		1	79	93	113						286	2390
SWIT	2	1	41	27	101	574	459			67	142	350	6	43	20	8	61	91	16		16		189	2198
DEN		41	7		456	259	30	1176		18	16			5	20	9	21			94	4			2156
CHI					138	1716				8	1			5		7	23	3	3	3	3	1		1905
ITA	8	4	8	81	232	876	85	77		21	74	72	26	45	143	63	30			13				1858
SPA		1			202	944		210	3	16	105	20		23	88	40	28			2			9	1691
AUS	8	18	12			521		686		20	15	7	1	1	46	60	74	12	85	12				1578
IND	3	3	13		302	340				38	20	43		6	1	155	11	11	1	1				947
CAN	19	34			71	309		16		40	111	8	7	40	8	98	2	23	63	6				815
POL	7			163	5	394	65						12		20	28	4	5	3					746
SWE		2	13			164					232			4	1	7	18	1	1	1	14			457
GRE					4	16		304					36		85									445
AUST					1	91										10	2						313	417
IRE	7	4	2			123	17	124	1				3	2	36	43	2					33		397
NOR			22		214	89					7			4	4	4	31	1	1	7				379
BRA					46	208					13		72		1					20				360
NEW		8	2			185								3	2	147	1	3	6					357
OTH	7	24		55	342	2675	16		62	11	169	7	38	36	62	168	176	256	17				99	4220
TOTAL	1734	650	554	1322	7701	26770	2041	6536	790	1797	2412	839	3722	1085	1694	1584	2095	2394	3384	1652	2284	538	5754	79312

〈Table 4〉 Publication output of various countries in different sub-fields of Hepatitis during 1984-1993

COUN	Bio	DenT	Der	Epi	Gas	Gen	Hem	Hep	HIV	Imm	Inf	Lab	Mic	Nep	Nur	Onc	Pat	Ped	Pha	Pub	Sur	Tox	Vir	tot
USA	238	253	76	134	1034	2780	218	826	82	243	491	176	661	76	296	391	260	423	321	220	447	161	1213	11020
UK	126	67	20	90	196	1491	65		23	200	145	19	167	10	87	70	171	80	350	77	140	23	148	3765
JAP	5		3		286	1344				25		65	33			60	32	26	41	1	7	10	18	1856
GER	32		3		122	725	51	137		81	119	17	107	49		17	91	63	37	6	27	41		1795
RUS			3	142		924					74	93				1	47	93	65				178	1620
FRA	1	24	17	13	326	487	64	38		7		40			4	94	48	9	33	4	4	11	39	1259
NETH	68		1	3		201	2	414		69	1		67		17	4		57			1	11	173	1089
ITAL	4	4	8	78	90	483	19			21		73	31	3	28	42	45	14			3			946
SWI		1	12	10	52	289	159			35		65	152	6	16	15	8	40	24	8		39		941
CHI						815													1					816
SPA					92	461				7		35				11	56	5	14	1				682
AUS	3	13	2			229		131		2	1	1	1	7		17	10	4	4	3				427
DEN		11	2		211	112	14	31		3		2			5	7			16		3			417
IND	3	3	11		94	183					23	3	19	2	2	1		40	5	5				392
POL	2			78	5	195	54			22						10	14	1	1					382
CAN	15	21				108					45	3		14	7	27	10	10	21	6				277
SWE		1	13			110					111					1	6	18		1	1			262
AUST					1	53												10					181	245
IRE		4				47	1	124							2	1			3			1		183
NEW		3				122								2					20		1	6		154
BRA					18	87							28							10				143
NOR					80	42												5						127
GRE					4	7										9								20
OTH	3	11		12	104	1344	8			42	10	85	1	20	4	28	99	38	108	4	4	58		1979
TOT	500	416	171	560	2715	12649	655	1701	105	757	935	438	1437	291	436	632	862	1038	1037	525	656	264	2047	30827

tries, and the remaining countries grouped as "others" in <Table 4>. Since the mere counting of publications may not be effective in judging the quantity of output and in order to measure the output by different countries on these sub-fields, the bibliometric indicator known as Research Priority Index has been employed for cross national comparison (Nagpaul 2000)23. For this purpose the output has been presented in two block of periods i.e. 1984-1993 and 1994-2003. It is to be pointed out that the countries have been selected with output of 100 and above. The remaining countries are grouped as 'others'. The contributions of the countries in 23 sub-fields of Hepatitis for the periods 1984-1993 and 1994-2003 are shown in Tables 4 and 5 respectively.

6.4 Publication output of various countries in different sub-fields of Hepatitis during 1984-1993

The distribution of countries in the sub-fields for the period 1984-1993 is shown in Table 4, which reveals that publications on 'General Medicine' has resulted in higher number (12,649) followed by 'Gastroenterology'(2,115), 'Virology'(2,047), 'Hepa-

tology'(1,701) and 'Microbiology'(1,437). The output in other sub-fields was in the range between 105 to 1038 contributions.

6.5 Publication output of various countries in different sub-fields of Hepatitis during 1994-2003

The distribution of contributions among the sub-fields for the period 1994-2003 <Table 5> reveals that the sub-field 'General Medicine' has the highest number of articles (14,121) followed by 'Gastroenterology'(4,986), 'Hepatology'(4,835), and 'Virology'(3,707). The productivity in other sub-fields is in the range between 234 and 2,347.

By comparing the output of research between two block periods, it was noticed that the major concentration of research has been on the following sub-fields namely, General Medicine, Gastroenterology, Virology and Hepatology. Of course, between the two periods of study, the ranking among the sub-fields varied, but fall within the four ranks. Further it is also noticed that the quantum of research output in these four major areas have shown the significant productivity from one block period to another period.

〈Table 5〉 Publication output of various countries in different sub-fields of Hepatitis during 1994-2003

COUN	Bio	DenT	Der	Epi	Gas	Gen	Hem	Hep	HIV	Imm	Inf	Lab	Mic	Nep	Nur	Onc	Pat	Ped	Pha	Pub	Sur	Tox	Vir	tot	
USA	742	113	147	222	2411	4161	530	1583	426	463	919	240	990	232	897	461	463	726	695	538	1128	157	2403	20647	
UK	236	47	75	163	306	1623	313	924	240	234	188	13	376	244	268	172	255	113	796	178	192	34	362	7352	
JAP	13	3	21	14	256	1655		12		31	28	37	45		61				34	3	32	6	19	2270	
GER	73		1	1	132	663	53	15		88	107	32	123	64	30	83	102	68	10	79	16	5		1745	
DEN		30	5		245	147	16	1145		15		14				13	9	5	5		91	4		1739	
FRA	6	3	56	17	486	619	63	10		8		111	2	5	102	56	15	8	10	8	10		69	1646	
NETH	126		11	101	20	266	10			71	5	173			31	4		254	11	6	24	409		1522	
SWI	2		29	17	49	275	300			32		77	198	27	5	5		21	67	8		150		1257	
AUS	5	5	10			282		555		18	15	6		1	39	43	64	8	81	9				1151	
CHI					138	901				8			1		5		7	22	3	3	3	1		1089	
SPA	1				110	483		210	3	9		70	20			12	32	35	14	1			9	1009	
ITA	4			3	142	393	66	77		24	1	41	23		17	101	18	16		10				912	
RUS	7			96	12	347				24		39	57			32		48					108	770	
IND			2		208	157			16		15	17	24	4	4		115	6	6	6	1			555	
CAN	4	13			71	201					66	8	4	26	1	71	2	13	42					538	
GRE					9			304					36		76										425
POL	5			85		199	11			18		12				10	14	3	4	3				364	
NOR			22		134	47					13	7		4	4	4	26	1	7					252	
BRA					28	121						44					1		10					217	
IRE	7		2		76	16				1		3			35			40	2			32		214	
NEW		5	2			63								1			2	127	1	2				203	
SWE		1				54					121		4			1		1	1	13				195	
AUST						38												2					132	172	
OTH	4	13		43	238	1331	8			20		1	84	6	18	32	34	69	138	148	13		41	2241	
TOT	1234	234	383	762	4986	14121	1386	4835	685	1040	1477	401	2285	794	1258	952	1233	1356	2347	1127	1608	274	3707	48485	

Based on the RPI matrix, a detailed Priority Index of various countries for the different sub-fields during 1984-1993 and 1994-2003 are presented in <Table 6> and <Table 7> respectively.

This study has adopted the procedure suggested by Barre 24 for fixing the benchmarks for qualitative description of the relative status of a sub-field within a country, as shown in <Table 8>. Based on the Barre formula, the priority profiles of different sub-fields in various countries during the two block periods is given in the <Table 9> and <Table 10> respectively.

In these tables, a “row” represents the priority status of different sub-fields in a given country, where as a “column” indicates the priority status of the given sub-field in different countries.

If all the sub-fields are concentrated in the middle, three categories of the five-

point scale, as shown in <Table 8> the profile can be considered as more or less homogeneous, i.e. research effort is diffused and there are no clear-cut priorities. On the other hand, if none of the sub-fields are in the middle three categories, the profile is differentiated, i.e. there are clear-cut priorities 25.

In the first phase of the research period covering from 1984-1993, there are high priorities in 10 sub-fields in USA followed by 9 in UK and 8 in Germany. In other countries, the sub-fields having high priorities were ranging from 1 to 6. On the other hand, in the second phase (1994-2003) there are high priorities for 10 sub-fields in Germany, 9 in UK, 8 in USA, 7 each in Canada, Russia and Netherlands. In other countries, the high priorities range from one discipline to five disciplines. In other words, there are priorities either high or low because, most of the sub-fields in each country concentrated in middle three categories namely +, -, 0.

The reasons may be attributed to the fact that during 1984-1993 the total outputs in all the sub-fields were 30,827 <Table 4>. On other hand, during 1994-2003 it was 48,485 contributions <Table 5>

<Table 8> Benchmarks for Qualitative Description

Scale	Priority status	Symbolic representation
PI < 70	Low	- -
70 < PI < 90	Below average	-
90 < PI < 110	Average	0
110 < PI < 130	Above average	+
PI > 130	High	++

<Table 6> Research Priority Index of various countries in different subfields of Hepatitis during 1984-1993

COUN	Bio	Dent	Der	Epi	Gas	Gen	Hem	Hep	HIV	Imm	Inf	Lab	Mic	Nep	Nur	Onc	Pat	Ped	Pha	Pub	Sur	Tox	Vir
USA	133	170	124	67	107	61	93	136	218	90	147	112	129	73	190	173	84	114	87	117	191	171	166
UK	206	132	96	132	59	97	81	0	179	216	127	36	95	28	163	91	162	63	276	120	175	71	59
JAP	16	0	28	0	166	167	0	0	0	52	0	234	36	0	0	150	59	39	62	3	17	60	14
GER	114	0	31	0	80	102	139	144	0	191	227	69	133	301	0	48	189	108	64	20	74	278	0
RUS	0	0	33	483	0	139	0	0	0	0	0	321	123	0	0	3	104	170	119	0	0	0	165
FRA	5	141	243	57	294	94	239	55	0	23	0	0	68	0	0	15	267	113	21	154	15	102	47
NETH	385	0	17	15	0	45	9	689	0	258	3	0	132	0	0	76	13	0	156	0	4	118	289
ITA	26	31	152	454	108	124	95	0	0	90	0	543	70	34	0	144	159	141	44	0	15	0	0
SWIT	0	8	230	58	63	77	795	0	0	151	0	0	148	1711	45	83	57	25	126	150	40	0	62
CHI	0	0	0	0	0	243	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
SPA	0	0	0	0	153	165	0	0	0	42	0	0	110	0	0	0	58	244	22	121	7	0	0
AUS	43	226	84	0	0	131	0	556	0	19	0	16	5	0	116	0	142	70	28	55	33	0	0
DEN	0	195	86	0	575	65	158	135	0	29	0	0	10	0	0	58	60	0	114	0	34	0	0
IND	47	57	506	0	272	114	0	0	0	0	193	54	104	0	36	12	0	303	38	75	0	0	0
POL	32	0	0	1124	15	124	665	0	0	235	0	0	0	0	0	0	94	109	8	15	0	0	0
CAN	334	562	0	0	0	95	0	0	0	0	536	0	23	0	357	123	349	0	107	445	102	0	0
SWE	0	28	894	0	0	102	0	0	0	0	1397	0	0	0	0	19	82	204	0	22	18	0	0
AUST	0	0	0	0	5	53	0	0	0	0	0	0	0	0	0	0	0	121	0	0	0	0	1113
IRE	0	162	0	0	0	63	26	1228	0	0	0	0	0	0	77	27	0	0	49	0	0	64	0
NEW	0	144	0	0	0	193	0	0	0	0	0	0	0	0	92	0	0	0	386	0	31	455	0
BRA	0	0	0	0	143	148	0	0	0	0	0	0	420	0	0	0	0	0	0	411	0	0	0
NOR	0	0	0	0	715	81	0	0	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0
GRE	0	0	0	0	227	85	0	0	0	0	0	0	0	0	0	2195	0	0	0	0	0	0	0
OTH	9	41	0	33	60	166	19	0	0	86	0	36	92	5	71	10	51	149	57	320	9	0	44

〈Table 7〉 Research Priority Index of various countries in different subfields of Hepatitis during 1994-2003

COUN	Bio	Dent	Der	Epi	Gas	Gen	Hem	Hep	HIV	Imm	Inf	Lab	Mic	Nep	Nur	Onc	Pat	Ped	Pha	Pub	Sur	Tox	Vir
USA	141	113	90	68	114	69	90	77	146	105	146	141	102	69	167	114	88	126	70	112	165	135	152
UK	126	132	129	141	40	76	149	126	231	148	84	21	109	203	140	119	136	55	224	104	79	82	64
JAP	23	27	117	39	110	250	0	5	0	64	40	197	42	0	0	137	0	0	31	6	43	47	11
GER	164	0	7	4	74	130	106	9	0	235	201	222	150	224	0	88	187	209	81	25	137	162	4
DEN	0	357	36	0	137	29	32	660	0	40	0	0	17	0	0	0	29	19	6	0	158	41	0
FRA	14	38	431	66	287	129	134	6	0	23	0	0	143	7	0	15	244	122	19	21	18	0	55
NETH	325	0	91	422	13	60	23	0	0	217	11	0	241	0	0	104	10	0	345	31	12	279	351
SWIT	6	0	292	86	38	75	835	0	0	119	0	0	130	962	0	109	16	0	35	229	19	0	156
AUS	17	90	110	0	0	87	0	484	0	73	43	63	0	5	131	0	147	199	14	303	24	0	0
CHI	0	0	0	0	123	284	0	0	0	34	0	0	2	0	18	0	0	23	42	12	8	16	0
SPA	0	21	0	0	106	164	0	209	21	42	0	0	147	121	0	0	47	113	72	60	3	0	12
ITA	17	0	0	21	151	148	253	85	0	0	0	13	95	154	0	95	435	71	36	0	33	0	0
RUS	36	0	0	793	15	155	0	0	0	145	0	612	157	0	0	0	163	0	129	0	0	0	183
IND	0	0	46	0	364	97	0	0	0	0	89	370	92	0	28	0	0	741	22	47	5	0	0
CAN	29	501	0	0	128	128	0	0	211	0	403	180	16	0	186	9	519	13	50	336	0	0	0
GRE	0	0	0	0	0	7	0	717	0	0	0	0	180	0	0	911	0	0	0	0	0	0	0
POL	54	0	0	1486	0	188	106	0	0	231	0	0	70	0	0	0	108	138	17	47	25	0	0
NOR	0	0	1105	0	517	64	0	0	0	0	0	336	0	0	0	81	62	369	0	17	84	0	0
BRA	0	0	0	0	125	191	0	0	0	0	197	0	430	0	0	0	0	16	0	198	0	0	0
IRE	129	0	118	0	0	122	262	0	0	22	0	0	30	0	0	833	0	0	386	40	0	2646	0
NEW	0	510	125	0	0	107	0	0	0	0	0	0	0	0	19	0	0	35	1292	21	30	0	0
SWE	0	106	0	0	0	95	0	0	0	0	2037	0	0	125	0	0	20	0	11	0	201	0	0
AUST	0	0	0	0	0	76	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	1004
OTH	7	120	0	122	103	204	12	0	0	42	0	5	80	16	31	73	60	110	127	284	17	0	24

〈Table 9〉 Research Priority Index of various countries in different subfields of Hepatitis during 1984-1993

COUN	Bio	DenT	Der	Epi	Gas	Gen	Hem	Hep	HIV	Imm	Inf	Lab	Mic	Nep	Nur	Onc	Pat	Ped	Pha	Pub	Sur	Tox	Vir
USA	++	++	+	-	0	-	0	++	++	-	++	+	+	-	++	++	-	+	-	+	++	++	++
UK	++	++	-	++	-	0	-	NIL	++	++	+	-	0	-	++	0	++	-	++	+	++	++	-
JAP	-	NIL	-	NIL	++	++	NIL	NIL	NIL	-	NIL	++	-	NIL	NIL	++	-	-	-	-	-	-	-
GER	+	NIL	-	NIL	-	0	++	++	NIL	++	++	-	++	++	NIL	-	++	0	-	-	-	-	NIL
RUS	NIL	NIL	-	++	NIL	++	NIL	NIL	NIL	NIL	NIL	++	+	NIL	NIL	-	0	++	+	NIL	NIL	NIL	++
FRA	-	++	++	-	++	0	++	-	NIL	-	NIL	NIL	-	NIL	NIL	-	++	0	-	++	-	+	-
NETH	++	NIL	-	-	NIL	-	-	++	NIL	++	-	NIL	++	NIL	NIL	-	-	NIL	++	NIL	NIL	-	++
ITA	-	-	++	++	0	+	0	NIL	NIL	-	NIL	++	-	-	NIL	++	++	-	-	NIL	-	-	NIL
SWIT	NIL	-	++	-	-	-	++	NIL	NIL	++	NIL	NIL	++	++	-	-	-	-	+	++	-	-	NIL
CHI	NIL	NIL	NIL	NIL	NIL	++	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	-	NIL	NIL	NIL	NIL
SPA	NIL	NIL	NIL	NIL	++	++	NIL	NIL	NIL	-	NIL	NIL	0	NIL	NIL	NIL	-	++	-	+	-	-	NIL
AUS	-	++	-	NIL	NIL	++	NIL	++	NIL	-	NIL	-	-	NIL	+	NIL	++	-	-	-	-	-	NIL
DEN	NIL	++	-	NIL	++	-	++	++	NIL	-	NIL	NIL	-	NIL	NIL	-	-	NIL	+	NIL	-	-	NIL
IND	-	-	++	NIL	++	0	NIL	NIL	NIL	NIL	++	-	0	NIL	-	-	NIL	++	-	-	NIL	NIL	NIL
POL	-	NIL	NIL	++	-	+	++	NIL	NIL	++	NIL	NIL	NIL	NIL	NIL	NIL	0	0	-	-	NIL	NIL	NIL
CAN	++	++	NIL	NIL	NIL	0	NIL	NIL	NIL	NIL	++	NIL	-	NIL	++	+	++	NIL	0	++	0	NIL	NIL
SWE	NIL	-	++	NIL	NIL	0	NIL	NIL	NIL	NIL	++	NIL	NIL	NIL	NIL	-	-	++	NIL	-	-	NIL	NIL
AUST	NIL	NIL	NIL	NIL	-	-	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	++
IRE	NIL	++	NIL	NIL	NIL	-	-	++	NIL	NIL	NIL	NIL	NIL	NIL	-	-	NIL	-	-	NIL	NIL	-	NIL
NEW	NIL	++	NIL	NIL	NIL	++	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	0	NIL	NIL	NIL	++	NIL	-	++	NIL
BRA	NIL	NIL	NIL	NIL	++	++	NIL	NIL	NIL	NIL	NIL	NIL	++	NIL	NIL	NIL	NIL	NIL	NIL	++	NIL	NIL	NIL
NOR	NIL	NIL	NIL	NIL	++	-	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	+	NIL	NIL	NIL	NIL	NIL
GRE	NIL	NIL	NIL	NIL	++	-	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	++	NIL	NIL	NIL	NIL	NIL	NIL	NIL
OTH	-	-	NIL	NIL	-	++	-	NIL	NIL	-	NIL	-	0	-	-	-	-	++	-	++	-	-	-

(Table 10) Research Priority Index of various countries in different subfields of Hepatitis during 1994-2003

COUN	Bio	DenT	Der	Epi	Gas	Gen	Hem	Hep	HIV	Imm	Inf	Lab	Mic	Nep	Nur	Onc	Pat	Ped	Pha	Pub	Sur	Tox	Vir
USA	++	+	-	-	+	-	-	-	++	0	++	++	0	-	++	+	-	+	-	+	++	++	++
UK	+	++	+	++	-	-	++	+	++	++	-	-	0	++	++	+	++	-	++	0	-	-	-
JAP	-	-	+	-	0	++	NIL	-	NIL	-	-	++	-	NIL	NIL	++	NIL	NIL	-	-	-	-	-
GER	++	NIL	-	-	-	+	0	-	NIL	++	++	++	++	++	NIL	-	++	++	-	-	++	++	-
DEN	NIL	++	-	NIL	++	-	-	++	NIL	-	NIL	NIL	-	NIL	NIL	NIL	-	-	-	NIL	++	++	NIL
FRA	-	-	++	-	++	+	++	-	NIL	-	NIL	NIL	++	-	NIL	-	++	+	-	-	-	NIL	-
NETH	++	NIL	0	++	-	-	-	NIL	NIL	++	-	NIL	++	NIL	NIL	0	-	NIL	++	-	-	++	++
SWIT	-	NIL	++	-	-	-	++	NIL	NIL	+	NIL	NIL	+	++	NIL	0	-	NIL	-	++	-	NIL	++
AUS	-	-	0	NIL	NIL	-	NIL	++	NIL	-	-	-	NIL	-	++	NIL	++	++	-	++	-	NIL	NIL
CHI	NIL	NIL	NIL	NIL	+	++	NIL	NIL	NIL	-	NIL	NIL	-	NIL	-	NIL	NIL	-	-	-	-	-	NIL
SPA	NIL	-	NIL	NIL	0	++	NIL	++	-	-	NIL	NIL	++	+	NIL	NIL	-	+	-	-	-	NIL	-
ITA	-	NIL	NIL	-	++	++	++	-	NIL	NIL	NIL	-	0	++	NIL	0	++	-	-	NIL	-	NIL	NIL
RUS	-	NIL	NIL	++	-	++	NIL	NIL	NIL	++	NIL	++	++	NIL	NIL	NIL	++	NIL	+	NIL	NIL	NIL	++
IND	NIL	NIL	-	NIL	++	0	NIL	NIL	NIL	NIL	-	++	0	NIL	-	NIL	NIL	++	-	-	-	NIL	NIL
CAN	-	++	NIL	NIL	+	+	NIL	NIL	++	NIL	++	++	-	NIL	++	-	++	-	-	++	NIL	NIL	NIL
GRE	NIL	NIL	NIL	NIL	NIL	-	NIL	++	NIL	NIL	NIL	NIL	++	NIL	NIL	++	NIL	NIL	NIL	NIL	NIL	NIL	NIL
POL	-	NIL	NIL	++	NIL	++	0	NIL	NIL	++	NIL	NIL	-	NIL	NIL	NIL	0	++	-	-	-	NIL	NIL
NOR	NIL	NIL	++	NIL	++	-	NIL	NIL	NIL	NIL	NIL	++	NIL	NIL	NIL	-	-	++	NIL	-	-	NIL	NIL
BRA	NIL	NIL	NIL	NIL	+	++	NIL	NIL	NIL	NIL	++	NIL	++	NIL	NIL	NIL	NIL	-	NIL	++	NIL	NIL	NIL
IRE	+	NIL	+	NIL	NIL	+	++	NIL	NIL	-	NIL	NIL	-	NIL	NIL	++	NIL	NIL	++	-	NIL	++	NIL
NEW	NIL	++	+	NIL	NIL	0	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	-	NIL	NIL	-	++	-	-	NIL	NIL
SWE	NIL	0	NIL	NIL	NIL	0	NIL	NIL	NIL	NIL	++	NIL	NIL	+	NIL	NIL	-	NIL	-	NIL	++	NIL	NIL
AUST	NIL	NIL	NIL	NIL	NIL	-	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	-	NIL	NIL	NIL	++
OTH	-	+	NIL	++	0	++	-	NIL	NIL	-	NIL	-	-	-	-	-	-	++	++	++	-	NIL	-

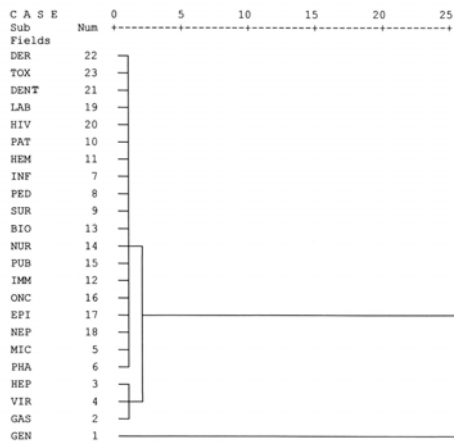
However, in the both the phases the re- search priority profile are more or less homogenous and seems majority of the sub-fields in many countries are con- centrated in the middle three categories. It is also observed that many sub-fields in many countries have shown NIL pro- ductions in the both the productivity blocks <Table 9> and <Table 10>. Similar results were observed in the studies conducted by Rajendiran on Fiber Optics 26 and Parames- waran on Air Pollution 27.

6.6 Cluster Analysis

The productivity of Hepatitis research under the various sub-fields has been an- alysed through cluster analysis technique using Average Linkage Methods. It has been mentioned in <Table 11> the research productivity has been grouped under 23 sub-fields. On clustering the output be- tween the sub-fields and countries, the resulting dendrograms are presented as <Figure 2> and <Figure 3>.

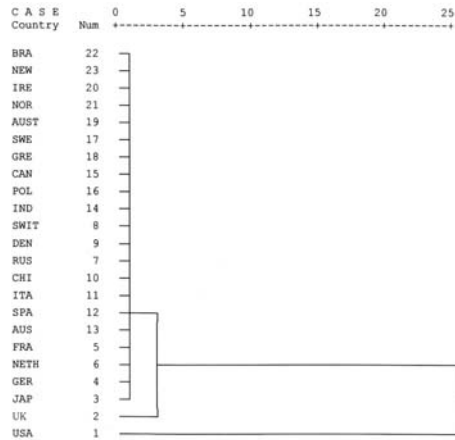
<Table 11> Variable codes for Hepatitis Sub-fields

S.No.	Variable Code	Variable (Sub-fields)	Research output	Cumulative Total
1	GEN	General medicine	26770	26770
2	GAS	Gastroenterology	7701	34471
3	HEP	Hepatology	6536	41007
4	VIR	Virology	5754	46761
5	MIC	Microbiology	3722	50483
6	PHA	Pharmacology	3384	53867
7	INF	Infectious diseases	2412	56279
8	PED	Pediatrics	2394	58673
9	SUR	Surgery	2264	60937
10	PAT	Pathology	2095	63032
11	HEM	Hematology	2041	65073
12	IMM	Immunology	1797	66870
13	BIO	Biochemistry	1734	68604
14	NUR	Nursing	1694	70298
15	PUB	Public health	1652	71950
16	ONC	Oncology	1584	73534
17	EPI	Epidemiology	1322	74856
18	NEP	Nephrology	1085	75941
19	LAB	Laboratory medicine	839	76780
20	HIV	Human Immunodeficiency Virus	790	77570
21	DENT	Dentistry	650	78220
22	DER	Dermatology	554	78774
23	TOX	Toxicology	538	79312



<Figure 2> Dendrogram for Hepatitis Sub-fields

Average Linkage Method
(Between sub-fields of Hepatitis)
Rescaled Distance Cluster Combine



<Figure 3> Dendrogram for Countries

Average Linkage Method
(For the output by various countries)
Rescaled Distance Cluster Combine

<Table 12> Country Codes for Hepatitis Sub-fields

S.No.	Variable Code	Variable (Subfields)	Research output
1	USA	United States of America	31667
2	UK	United Kingdom	11117
3	JAP	Japan	4226
4	GER	Germany	3470
5	FRA	France	2905
6	NETH	Netherlands	2611
7	RUS	Russia	2390
8	SWIT	Switzerland	2198
9	DEN	Denmark	2156
10	CHI	China	1905
11	ITA	Italy	1858
12	SPA	Spain	1691
13	AUS	Australia	1578
14	IND	India	947
15	CAN	Canada	815
16	POL	Poland	746
17	SWE	Sweden	457
18	GRE	Greece	445
19	AUST	Austria	417
20	IRE	Ireland	397
21	NOR	Norway	379
22	BRA	Brazil	360
23	NEW	New Zealand	357
24	OTH	Others	4220
	Total		79312

The individual sub-field codes and their output have been shown in the <Table 11>. Similarly, the individual country codes and their output have been shown in <Table 12>.

It is seen from the dendrogram <Figure 2> that at 11% level three clusters have been formed, Cluster-I formed with sub-

field namely General Medicine, Cluster-II formed with three sub-fields namely Hepatology, Virology and Gastroenterology and the remaining are formed in the third cluster. On examination of the output of the contributions on “General Medicine” as the branch of Hepatitis has max-

<Table 13> Cluster I : Core Hepatitis sub field

S.No.	Variable Code	Variables (sub-field)	Research Output
1	GEN	General Medicine	26,770

<Table 14> Cluster II : Secondary Level Hepatitis Sub-fields

S.No.	Variable Code	Variables (sub-field)	Research Output
1	HEP	Hepatology	6,536
2	VIR	Virology	5,754
3	GAS	Gastroenterology	7,701

<Table 15> Cluster III : Tertiary Level Hepatitis Sub-fields

S.No.	Variable Code	Variables (sub-field)	Research Output
1	DER	Dermatology	554
2	TOX	Toxicology	538
3	DENT	Dentistry	650
4	LAB	Laboratory Medicine	839
5	HIV	Human Immunodeficiency Virus	790
6	PAT	Pathology	2,095
7	HEM	Hematology	2,041
8	INF	Infectious Diseases	2,412
9	PED	Pediatrics	2,394
10	SUR	Surgery	2,264
11	BIO	Biochemistry	1,734
12	NUR	Nursing	1,694
13	PUB	Public Health	1,652
14	IMM	Immunology	1,797
15	ONC	Oncology	1,584
16	EPI	Epidemiology	1,322
17	NEP	Nephrology	1,085
18	MIC	Microbiology	3,722
19	PHA	Pharmacology	3,384

imum number of records (26,770) (Table 13). This is followed by the three sub-fields in cluster-II (Table 14) having records ranging from 5,754 to 7,701. In the third cluster (Table 15), the output in the other sub-fields are ranging from 538 to 2,412.

It is inferred from above analysis, that the research productivity on Hepatitis is highly concentrated on the four sub-field groups (Cluster-I & II) which has been corroborated with the data given in (Table 13) and (Table 14).

For the purpose of analysis, the clustering levels of individual sub-fields with respective countries are consolidated and the data presented in Table 16. It is seen from Table-16 that USA forms the core country individually in all the sub-fields except Nephrology and jointly with U.K, in sub-fields like Pharmacology, Pathology and Immunology. The second level of cluster for the individual sub-fields are formed with combination of various countries. It is observed that U.K, France and Denmark are mostly figured in the second level cluster. Further it is observed that India's position ranging from third to sixteenth out of 23 countries studied.

It is interesting to note that India's research in Pediatrics is significant as it is

clustered with the second level along with the countries namely U.K, Germany, France, Spain, Russia and Australia. In the productivity of Pediatrics sub-field, India is in the third position. It is also significant to note that output of 23 sub-fields, India ranks 6th position in two sub-fields namely Gastroenterology and Infectious Diseases, 7th position in Biochemistry and Laboratory Medicine, 8th position in Nursing, 10th position in Public Health and Dermatology.

As a corollary to the above mentioned analysis, another cluster analysis has been conducted with individual country's output. The resulting dendrogram has been presented in Figure 3. It is seen from the figure at 14% level three clusters have been formed.

In this connection it may be mentioned that 23 countries were considered for cluster analysis. Countries grouped under others have not been included since their output is merger. In the cluster-I (Table 17) only one country i.e. USA is formed, followed by UK as cluster-II (Table 18). So Cluster I has been named as core country in Hepatitis research, Cluster II is secondary country. Other 21 countries have formed in the third cluster (Table 19).

〈Table 16〉 Clustering Levels of Sub-Fields with Countries

S. No.	Sub-Fields	Core Level	Second Level	India's Position
1	GEN	USA(6941)	UK (3114), JAP (2999)	16 (340)
2	GAS	USA(3445)	FRA(812), DEN(456), JAP(542), UK(502), IND(302), ITA(232)	6 (302)
3	HEP	USA(2409)	DEN(1176), AUS(686), UK(924)	-
4	VIR	USA(3616)	NETH(686), UK(924), AUST(313), RUS(286)	-
5	MIC	USA(1651)	UK(543)	12 (43)
6	PHA	USA(1016), UK(1146)	NETH(131), NEW(147), RUS(113), GER(105), SWIT(61), JAP(75)	12 (11)
7	INF	USA(1410)	UK(333), SWE(232), GER(226), CAN(111)	6 (38)
8	PED	USA(1149)	UK(193), IND(155), GER(165), FRA(104), SPA(88), RUS(93), AUS(74)	3 (155)
9	SUR	USA(1575)	UK(332), DEN(94), GER(106), JAP(39), SWIT(16)	14 (1)
10	PAT	UK(426), USA(723)	ITA(143), FRA(196), GER(174)	-
11	HEM	USA(748)	SWIT(459), UK(378)	-
12	IMM	USA(706), UK(434)	NETH(140), GER(169)	-
13	BIO	USA(980)	UK(362)	7 (3)
14	NUR	USA(1193)	UK(355)	8 (6)
15	PUB	USA(758)	UK(255), CAN(63), AUS(85), SWIT(91), SPA(28), FRA(41)	10 (11)
16	ONC	USA(852)	UK(242)	16 (1)
17	EPI	USA(356)	RUS(238), UK(253)	-
18	NEP	UK(254)	SWIT(350), USA(308)	-
19	LAB	USA(416)	ITA(74), GER(49), RUS(113), JAP(102)	7 (20)
20	HIV	USA(508)	UK (263)	-
21	DENT	USA(366)	UK(114)	11 (3)
22	DER	USA(223)	FRA (73), UK(95)	10 (13)
23	TOX	USA(318)	FRA(11), JAP(16), CHI(1), NEW(6), DEN(4), IRE(33)	-

〈Table 17〉 Cluster I : Core country in Hepatitis Research

S.No.	Variable Code	Variables (sub-field)	Research Output
1	USA	United States of America	31,667

〈Table 18〉 Cluster II : Secondary Level Country in Hepatitis Research

S.No.	Variable Code	Variables (sub-field)	Research Output
1	UK	United Kingdom	11,117

〈Table 19〉 Cluster III : Tertiary Level Countries in Hepatitis Research

S.No.	Variable Code	Variables (sub-field)	Research Output
1	BRA	Brazil	360
2	NEW	New Zealand	357
3	IRE	Ireland	397
4	NOR	Norway	379
5	AUST	Austria	417
6	SWE	Sweden	457
7	GRE	Greece	445
8	CAN	Canada	815
9	POL	Poland	746
10	IND	India	947
11	SWIT	Switzerland	2,198
12	DEN	Denmark	2,156
13	RUS	Russia	2,390
14	CHI	China	1,905
15	ITA	Italy	1,858
16	SPA	Spain	1,691
17	AUS	Australia	1,578
18	FRA	France	2,905
19	NETH	Netherland	2,611
20	GER	Germany	3,470
21	JAP	Japan	4,226

As seen in the 〈Table 12〉 output of the USA is 31,667 which is 39.93%. Hence this is formed separately in cluster-I. The output of UK is 11,117 (14.02%) which forms as second cluster. The output of other countries ranging between 357 and 4,226, far below than USA and UK and hence they grouped as one cluster.

6.7 Multidimensional Scaling(Mds) for Research Output of Sub-Fields in Hepatitis

The application of Multidimensional sca-

ling technique to measure the relationship among the sub-fields of Hepatitis research productivity has been considered in this study. The resulting Euclidean distance model of MDS is presented as 〈Figure 4〉.

From the figure it is observed that the sub-fields of Hepatitis have been formed as four groups.

- Group-1 comprising of the subfield "GEN",
- Group-2 comprising of "GAS", "HEP" and "VIR"
- Group-3 comprising "MIC" and "PHA" ; and
- Group-4 comprising remaining subfields.

The subfields in the group 1 and 4 figured in the positive side of the Euclidean distance model. The sub-field in group-1 reveals higher productivity of publications.

The sub-fields in the group-2 and 3 namely "GAS", "HEP", "VIR", "MIC" and "PHA" though has high productivity but shows deviation among these fields. Hence the groups 2 and 3 are figured in the negative side of the model. Similarly those sub-fields in the group-4 although lies on the positive side but there exists negative relation, since the quantum of publications in these sub-fields are in the decreasing trend when compared to the first three groups in the model.

From the above analysis, the sub-fields "GEN", "GAS", "HEP", "VIR", "MIC" and "PHA" have more impact on Hepatitis research than other sub-fields considered in the study. The similar result has also been noticed in the cluster analysis (Figure 2).

7. Conclusion:

It was found that there were high priorities for some of the sub-fields of Hepatitis research during 1984-1993. In other words, during this period the re-

search priority profiles has been differentiated with clear cut priority and the profiles can be considered as heterogeneous. It was found that the research priority profile was more or less homogenous since majority of the sub-fields are showing either below or above average levels of priority profile. It was found that on clustering the individual countries output USA forms core country individually in all sub-fields followed by UK. The resulting Euclidean distance model of MDS shows that the sub-fields "General Medicine", "Gastroenterology", "Hepatology", "Virology", "Microbiology" and "Pharmacology" have more impact on Hepatitis research than other sub-fields considered in the study. In the productivity of Pediatrics sub-field, India is in the third position.

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