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A bibliometric study of literature on celiac disease

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Abstract

Celiac disease (CD) is a digestive autoimmune disorder, and prevalent among human-being worldwide, irrespective of gender, race, and ethnicity. Due to celiac disease an intestine get damaged, and become cumbersome for patients to absorb nutrients like fat, calcium, iron, and folate. This study is an attempt to make the quantitative study of research output on celiac disease (CD). Data of this study is obtained from Scopus (http://www.scopus.com) online database for the period 2001-12, and analyzed with different viewpoints. The study reveals that (14356) papers were published during the period under study. The highest number of papers (1604) was produced in the year 2011. Overall, number of papers has enlarged each year. USA is found the most productive country in celiac disease research which has (19.68 percent) share of total world publications. The USA publications have received total (27973) citations with (9.79) average citations per publication. The study concluded that the significant area of celiac disease research remains the medicine which has (86.82 percent) share of total research output. Adults have been main focal point of research, which account the highest publications share (37.35 percent) amongst other categories. UniversitàdegliStudi di Napoli Federico II, Italy is identified the most productive institution in celiac disease research which have contributed highest number of publications (231 papers; 6800 citations; h-index value 41). MarkkuMaki from University Hospital of Tampere, Finland is the most productive author who have contributed 157 publications, and received (5250) citations. Lastly, inferences have drawn based on this study which shall be beneficial to scientists in planning the strategies to combat this disease.

Keywords: *Celiac disease, Citation Analysis, Digestive disorder, Bibliometric Study.*

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1 Introduction

Celiac disease is (CD) also known as celiac sprue or gluten-sensitive enteropathy. Celiac disease (CD) is a digestive and autoimmune disorder. Many population based studies have been conducted using various combinations of sero-logical testing, and it was reported that prevalence of celiac disease is in the range of 0.5 to 1.0 percent in Europe and United States (Pividori etc. al, 2009). Occurrence of celiac disease in Middle East, India, and South Africa is in-between 3 to 20 percent. Because of its diverse appearance, it is estimated that up to 75 percent of cases remain

undiagnosed. It can occur at any age, and more common in females compare to males, but reason for this is not known so far (Sainsbury etc. al. 2013). In many clinical studies, it was found that presentation with non-specific symptoms or no symptoms is as common in the Middle East and Western countries (Malekzadeh et.al. 2005).. However, the symptoms of this disease are varied from person to person. Moreover, the following symptoms are apparent in the patients such as: abdominal bloating and pain, chronic diarrhea, vomiting, constipation, pale, foul-smelling, fatty stool and weight loss (http://digestive.niddk.nih.gov/ddiseases/pubs/celiac/). In celiac disease patients' intestine gets damaged. Therefore, it becomes difficult for patients to absorb nutrients such as: fat, calcium, iron, and folate. The person suffering with celiac disease, when eats meal with gluten then an immune system damage villi (a fingerlike protrusions in the intestine). Patient becomes malnourished without villi. In adults the digestive problem symptoms are likely to be found less but the following symptoms are common such as: fatigue, joint pain, bone loss, seizures, missed menstrual periods, infertility or recurrent miscarriage, and an itchy skin rash called dermatitis herpeticformis etc. are common. Celiac disease has been increasingly recognized with the prevalence widely as high as 1 percent in certain ethnic group, such as Caucasian females. The major possible presentations of celiac disease are (i) typical, characterized mostly by gastrointestinal signs and symptoms; (ii) atypical or extra intestinal (iii) silent, where the small intestinal mucosa is damaged (iv) latent, where individuals possess genetic compatibility with celiac disease (Setty, etc. al. 2008). The celiac disease patients' necessitates a lifelong, continual adherence to a gluten-free diet (Scherer, 2008). Allergy problem are common in patients suffering with CD (Williams, 1987), and atopic disorders cases are most prevalent among children (Kelly et. al, 1987). It is expressed in many studies that celiac disease prevalence was found to be increased in a population of atopic patients (Zauli, et. al., 2002). CD has hereditary elements, and in many studies it was identified that 20 percent of the immediate relatives are affected by this disease [Ploski et.al.1993 & Van Belzen et. al., 2004]. In recent days, the National Institutes of Health consensus group used the term latentceliac disease to define individuals with positive serology, and normal biopsy is being used by Doctors (Troncone et.al.,2003). Now-a-days awareness about the celiac disease is improving day by day, and diagnosis of the condition has augmented sharply. Besides this, the gluten free diet has

grown easier, as more food manufacturers produce foodstuffs that are safe to eat. This study is significant to understand the development in this field, so far no specific bibliometric study is carried out on CD. Moreover, bibliometric studies are carried on bone marrow (Gupta & Bala , 2012), stem cell research (Cantos-Mateos G.*et al.*, 2012 & Karpagama, R.*et. al.2012*), and other diseases such as dementia (Gupta, B.M. *et. al.*,2011), diabetes (Gupta, B.M. et. al.,2011 &), Krishnamoorthy et. al, 2009), glaucoma (Gupta & Kaur, 2013) etc.

2 Objectives

Patients suffering with digestive disorder face numerous kinds of problems in day to day life. In view of this, the research activities are being done around the world to counter the issues related to this disease. A bibliometric study in this area will help the scientists to understand the progress in this field. In particular, the study was limited to the following objectives:

i. to examine the growth of literature on CD during the period2001-2012.
ii. to ascertain the type of publications in CD research.
iii. to identify the country-wise research contribution on CD.
iv. to identify the celiac disease in context of different subjects.
v. to know the celiac disease research on different population group.
vi. to identify the highly productive institutions in CD research.
vii. to identify the core journals in the field of CD.
viii. to identify the most productive authors of CD research.

3 Methodology

The data for this study has been obtained from Scopus multidisciplinary database for a period during 2001- 12. Medical Subject Headings (MeSH) was consulted, and following terms were identified to retrieve the records in title, abstract and keywords fields i.e. ‘‘*Celiac’*, ‘*Celiac Artery’*, ‘*Celiac Sprue’, ‘Celiac Plexus’‘Ganglia, Sympathetic’* ‘*Celiac Ganglion’*. Following string was used to retrieve the records: TITLE-ABS-KEY (“*Celiac*”) OR TITLE-ABS-KEY(“Celiac”), (“*Celiac Artery”*”), (“*Celiac Sprue*”), (“*Celiac Plexus”*”), (“*Ganglia, Sympathetic*”), (“*Celiac Ganglion*”). Besides this, *h*-index derived from database has been used as evaluative performance measurement in the study (Hirsch, 2005). One year citation window is used in calculating the citations e.g. 2001-2002, 2002-2003 etc.

4 Results

Records related to celiac disease were retrieved in between the period 2001-2012. A total of 14356 records, and 178133 citations received to these publications were transferred to Microsoft Excel 2010, and data were analyzed as per the objectives of this study.

4.1 Year-Wise Growth of Celiac Disease Literature

It was found that, a total 14356 papers were published during 2001-12, which have received 178133 citations. Table 1 indicated below shows that the highest numbers of publications (1604) were in 2012, which have received 3214 citations with an average of 2.0 citations per publication. The second highest papers were published (1533) in the year 2011, followed by (1390) in the year 2010, and (1374) in the year 2009. The highest numbers of citations (4784) were recorded in the year 2011, followed by (3734) in the year 20029. The data has been categorized into two groups of six years each. It is found that there has been growth of 41.56 percent during 2007-12, compare to 2001-06. Overall, growth of the literature during the twelve years was calculated. The highest growth rate was observed during 2002 with an annual growth of (13 percent), followed by (10.28 percent) in the year 2011, and (9.98 percent) in the year 2007. The lowest growth rate was recorded (1.92 percent) in the year 2006.

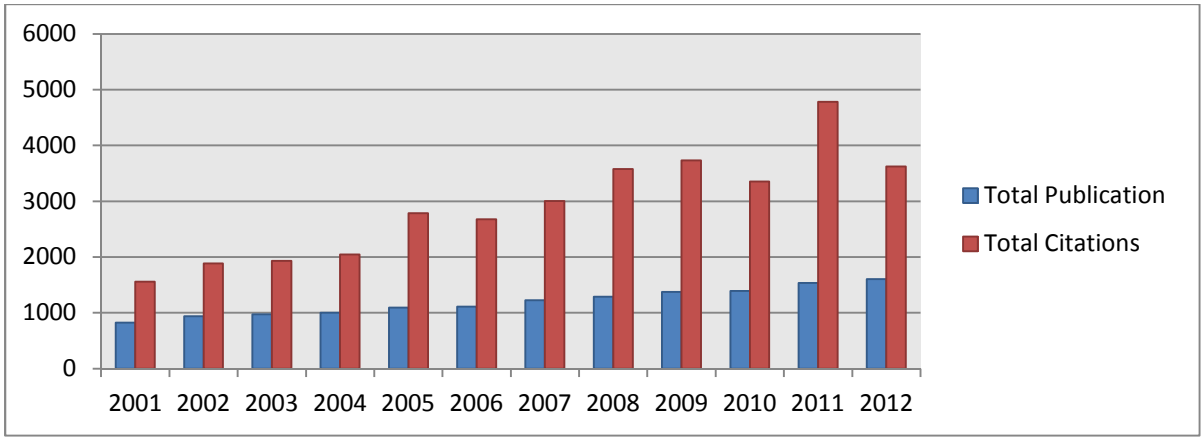
Table 1. Growth of Research Publication during 2001-2012

Year	No. of Publications	Growth of Publications	TC	ACPP
2001	826	-	1557	1.88
2002	938	13.00	1887	2.01
2003	974	3.00	1931	1.98
2004	1002	2.87	2044	2.04
2005	1091	8.88	2786	2.55
2006	1112	1.92	2674	2.40
2007	1223	9.98	3003	2.46
2008	1289	5.39	3578	2.78
2009	1374	6.59	3734	2.72
2010	1390	1.16	3351	2.41
2011	1533	10.28	4784	3.12
2012	1604	4.63	3624	2.26
TC-Total Citation; ACPP-Average Citation Per Publication				

4.2 Year-wise Distribution of Publications and Citations

Figure 1 given below shows that the highest average citations per publication (ACPP) was found in 2011 (3.12), followed by (2.78) in the year 2008, (2.72) in 2005, and (2.55) in 2005. During the time span 2001-06, total (5943) papers were published, which received total 113965 citations with an average (19.17) citations per publication, compare to (8413) publications in the period 2007-12, which have received (64168) citations with an average (7.62) citations per publication.

Figure 1.Year-wise Growth of Publications and Citations



Types of publications were also identified, and it was found that out of the total (14356) publications the highest numbers of documents are article published in journals i.e. 9361 (65.20 percent). Followed by other type of documents such as: reviews 2395 (16.68 percent), letter 1057 (7.36 percent), conference papers 431(3.00 percent), notes 382 (0.26 percent), editorial 368 (2.56 percent), short survey 258 (1.79 percent), articles in-press 56 (0.39 percent), erratum 43 (0.29 percent), books 3 (0.02 percent) and conference reviews 3 (0.02 percent).

4.3 Country-wise Distribution of Publications and Citations

Celiac disease literature was published around the globe, and 106 countries have given their contribution. Table 2 presents the top twenty most productive countries and their contribution in celiac disease research publications. The ranking of the countries for period 2001-06, 2007-12 and overall ranking for a period of 12 years is also listed. It is found that a total 14356 papers were published.

United States (USA) leads the list of most productive countries, which has contributed 2826 (19.68 percent) publications, and received 27973 (9.89 percent) citations. The second most productive country is Italy 1858 (12.94 percent) publications and received 31239(16.18 percent) citations. Other most productive countries amongst top twenty countries are: United Kingdom 1232 (8.58 percent) publications and 25972 (21.08 percent) citations, Germany 795 (5.53 percent) publications, and 11646 (14.64 percent) citations. Spain has contributed 711 (4.95 percent) publications and received 9832 (9.60 percent) citations, Japan 622 (4.33 percent) publications and 4634 (7.45 percent) citations, France 553 (3.85

percent) publications, and 8621 (15.58 percent) citations, Netherlands 528 (3.67 percent) publications and 12456 (23.59 percent) citations. USA, Italy, United Kingdom, Germany, Spain, Japan have maintained their position in terms of publication from 2001-06 to 2007-12, while Netherlands has gained from 8th position in 2001-06 to 7rd position in 2007-12.

Table 2. Country wise contribution of Research in Celiac Disease

Country	Total Publication			Share of Publication			Rank			TC	ACPP
	2001-2006	2007-2012	2001-2012	2001-2006	2007-2012	2001-2012	2001-2006	2007-2012	2001-2012		
United States	1115	1781	2826	18.76	21.16	19.68	1	1	1	27973	9.89
Italy	813	1045	1858	13.67	12.42	12.94	2	2	2	31239	16.81
United Kingdom	539	693	1232	9.06	8.23	8.58	3	3	3	25972	21.08
Germany	334	461	795	5.62	5.47	5.53	4	4	4	11646	14.64
Spain	289	422	711	4.86	5.01	4.95	5	5	5	6832	9.60
Japan	278	344	622	4.00	4.08	4.33	6	6	6	4634	7.45
France	266	287	553	4.47	3.41	3.85	7	9	7	8621	15.58
Netherlands	204	324	528	3.43	3.85	3.67	8	7	8	12456	23.59
Sweden	194	265	459	3.26	3.14	3.19	9	10	9	9834	21.42
China	97	306	403	1.63	3.63	2.80	15	8	10	1506	3.73
Turkey	127	262	389	2.13	3.11	2.70	13	11	11	1667	4.28
Canada	131	248	379	0.02	2.94	2.64	12	12	12	8052	21.24
Finland	149	196	345	2.50	2.32	2.40	11	14	13	8835	25.60
Poland	167	177	344	2.81	2.10	2.39	10	16	14	1985	5.77
India	83	216	299	1.39	2.56	2.08	18	13	15	1870	6.25
Australia	111	181	292	1.86	2.15	2.03	14	15	16	5035	17.24
Brazil	90	162	252	1.51	1.92	1.75	16	17	17	1458	5.78
Israel	72	109	181	1.21	1.29	1.26	19	18	18	2778	15.34
Norway	88	93	181	1.48	1.10	1.26	17	19	19	5074	28.03
Switzerland	69	94	163	1.16	1.11	1.13	20	20	20	2090	12.82

4.4 Celiac Disease Research in Terms of Different Subject Areas

The world publications output in CD research during 2001-12 has been distributed in twenty seven subjects. Table 3 depicts below shows that, the highest number of publication output coming from medicine (12465 papers, 68.51 percent share) of the total publications, followed by Biochemistry, Genetics and Molecular Biology (1797 papers, 9.88 percent share), Immunology and Microbiology (942 papers, 5.18 percent share). Other subjects have share of less than 20 percent.

Table 3.Celiac Disease Research in Context of Different Subjects

Subject Area	**Number of Papers %**		**2001-12**
	2001-12	**TC**	**ACPP**
Medicine	12465 (68.51)	148660	10.35
Biochemistry, Genetics and Molecular Biology	1797 (9.88)	25778	14.34
Immunology and Microbiology	942 (5.18)	19843	21.06
Agricultural and Biological Sciences	691 (3.80)	8928	12.92
Pharmacology, Toxicology and Pharmaceutics	439 (2.41)	5817	13.25
Neurosciences	386 (2.12)	5849	15.15
Nursing	174 (0.96)	3992	22.94
Health Profession	318 (1.75)	4380	13.77
Chemistry	174 (0.96)	1811	10.40
Undefined	139 (0.76)	599	4.30
Others	670 (3.68)	7019	3.82
Total	18195*		

** The total output is more than the real output because several journals are classified in more than one discipline*

4.5 Celiac Disease Research by Population Age Groups

Table 4 given below shows that the main focus of CD research has been on adults 5367 (37.35 percent) publications during the period 2001-12. Followed by Middle aged 3297 (22.95 percent) publications, Adolescents 2414 (16.81 percent) publications, Children 2489 (17.33 percent) publications, and Aged

people 2700 (18.80 percent) publications of the total publications share. However, some duplication in papers under different age groups, the total numbers of papers in various age groups are higher than the actual number of papers.

Table 4.Celiac Disease Research Output by Different Age Group

Population by Age Group	NUMBER OF PUBLICATIONS			Percentage of Papers		
	2001-06	2007-12	2001-12	2001-06	2007-12	2001-12
Adults	2014	2901	5367	33.89	34.48	37.35
Middle Aged	1400	1818	3297	23.55	21.60	22.96
Adolescents	1026	1341	2414	17.26	15.93	16.81
Children	1002	1442	2489	16.86	17.14	17.33
Aged Above 80 year	501	1609	2700	8.43	19.12	18.80
Total	5943	8413	14356	100.00	100.00	100.00

4.6 Profile of Highly Productive Institutions

Amongst the highly productive institutions, top fifteen most productive institutions involved in CD research have published 2004 papers (13.95 percent) with average 133.5 publications per institution, and received 54992 (30.87 percent) citations. Table 5 given below shows that the highest numbers of publications are contributed by UniversitàdegliStudi di Napoli Federico II, Naples, Italy 231 (1.60 percent) publications and received 6008 (3.37 percent) citations. This institution is ranked number one, followed by Mayo Clinic, United States194 (1.35 percent) publications and 5234 (2.93 percent) citations, University Hospital of Tampere, Finland 182 (1.26 percent) publications and 4329 (2.43 percent) citations, UniversitàdegliStudi di Roma La Sapienza, Rome, Italy 156 (1.08 percent) publications and 2899 (1.62 percent) citations, VU University Medical Center, Netherlands 146 (1.01 percent) publications and 3677 (2.06 percent).The average citation per paper (ACPP) registered by the total papers of these 15 institutions is 28.16 per publications based on the citations received by these institution's paper since their publication. The highest impact of 47.12 citations per publication was registered by Columbia University, College of Physicians and Surgeons, New York, United States followed by University of Tampere, Medical School, Finland 42.55 citations per publications, Universitetet i Oslo, Norway 35.68 citations per publications, University Medical Center Utrecht, Utrecht, Netherlands 34.03 citations per publications, Leiden University Medical Center– LUMC, Leiden, Netherlands 32.53

citations per publications. Rest of the institutions among the top 15 have registered less than 30 citations per publication. In the process of measuring the performance of these institutions on the basis of *h*- index, eight institutions have been identified with higher *h*-index value than the group average of 30. These are UniversitàdegliStudi di Napoli Federico II, Naples, Italywith*h*-index of (41),Mayo Clinic, Rochester , MN, United States with h-index (38), University of Tampere, Medical School, Finland(37), University Hospital of Tampere, Finland (36), Leiden University Medical Center– LUMC, Leiden, Netherlands (35), UniversitàdegliStudi di Roma La Sapienza, Rome, Italy (32), VU University Medical Center, Netherlands (32), Columbia University, College of Physicians and Surgeons, New York , United States (32), Universitetet i Oslo, Norway (32) respectively. (Table 5)

Table 5.Profile of Highly Productive Institutions

Rank	Name of the Institution/ University	TP	TC	ACPP	h-Index
1	UniversitàdegliStudi di Napoli Federico II, Naples, Italy	231	6008	26.00	41
2	Mayo Clinic, Rochester , MN, United States	194	5234	26.97	38
3	University Hospital of Tampere, Finland	182	4329	23.78	36
4	UniversitàdegliStudi di Roma La Sapienza, Rome, Italy	156	2899	18.58	32
5	VU University Medical Center, Netherlands	146	3677	25.18	32
6	Leiden University Medical Center– LUMC, Leiden, Netherlands	126	4100	32.53	35
7	UniversitàdegliStudi di Milano, Milan, Italy	116	2468	21.27	28
8	Royal Hallamshire Hospital, South Yorkshire, United Kingdom	114	2833	24.85	26
9	UniversitàdegliStudi di Pavia, Pavia, Italy	110	2280	20.72	26
10	Alma Mater StudiorumUniversità di Bologna, Bologna, Italy	109	2582	23.68	26
11	UniversitàCattolica del SacroCuore, Rome, Italy	107	2083	19.46	22
12	Columbia University, College of Physicians and Surgeons, New York , United States	106	4995	47.12	32
13	University of Tampere, Medical School, Finland	104	4426	42.55	37
14	Universiteteti Oslo, Norway	102	3640	35.68	32
15	University Medical Center Utrecht, Utrecht, Netherlands	101	3438	34.03	31

4.7 Profile of Highly Productive Authors

Table 6 given below shows that the fifteen authors have been identified as productive authors, who have published more than 50 articles on celiac research. The contribution of these 10 authors' together shares a 9.99 percent of world publication.The contribution is 1464 papers output during 2001-12. Six authors have published higher number of papers than the group average 133.6 papers. The most productive authors on this parameter are Maki, Markku (157 papers); Kaukinen, Katri (143 articles); Murray, Joseph Anthony. (120 articles); Collin, Pekka O (113 articles); Sanders, David Surendran (109 articles) and Sollid, LudvigMagne (102 articles).These ten most productive authors have received a total of 50016citations for 1464 papers with an average of 52.1 citations per paper. It is identified that six authors have registered higher impact than the group average. These authors are Green, Peter HrR. (72.06), Fasano, Alessio. (51.23), Sollid, LudvigMagne (46.47), Wijmenga, Cisca (41.87), Catassi, Carlo (41.82), Murray, Joseph Anthony (39.46), Nine authors have achieved a higher h-index value than the group average of 42.2. These are Gasbarrini, Giovanni Battista. (62),Wijmenga, Cisca (59), Maki, Markku(48), Sollid, LudvigMagne (47), Fasano, Alessio (45).

Table 6**.** Most Productive Authors and their Impact

Rank	Name	Organization	TP	TC	ACPP	h-Index
1	Maki, Markku	University Hospital of Tampere, Pediatric Research Center, Tampere, Finland	157	5250	33.43	48
2	Kaukinen, Katri	University Hospital of Tampere, Department of Gastroenterology and Alimentary Tract Surgery, Tampere, Finland	143	3630	25.38	37
3	Murray, Joseph Anthony	Mayo Clinic,Rochester, United States	120	4736	39.46	42
4	Collin, Pekka O.	University Hospital of Tampere, Department of Gastroenterology and Alimentary Tract Surgery,Tampere, Finland	113	3567	31.56	46
5	Sanders, David Surendran	University of Sheffield, Gastroenterology and Liver Unit,Sheffield, United Kingdom	109	2653	24.33	39
6	Sollid, LudvigMagne	University of Oslo, Centre for Immune Regulation,Oslo, Norway	102	4740	46.47	47

7	Corazza, Gino Roberto	University of Pavia, ClinicaMedica I, Pavia, Italy	98	2464	25.14	39
8	Troncone, Riccardo	University of Naples Federico II, Department of Pediatrics and European Laboratory for the Investigation of Food-Induced Diseases,Naples, Italy	94	2206	23.46	37
9	Fasano, Alessio	University of Maryland School of Medicine, Mucosal Biology Research Center,Baltimore, United States	85	4355	51.23	45
10	Wijmenga, Cisca	University Medical Center Groningen, Department of Human Genetics,Groningen, Netherlands	83	3476	41.87	59
11	Gasbarrini., Giovanni Battista	Catholic University of the Sacred Heart, Rome, Department of Internal Medicine, Rome, Italy	78	1479	18.96	62
12	Green, Peter Hr R	Columbia University, College of Physicians and Surgeons, Celiac Disease Center, New York, United States	77	5549	72.06	38
13	Ludvigsson, Jonas F.	Mayo Clinic, Departments of Immunology and Internal Medicine, Rochester, United States	76	1160	15.26	24
14	Catassi, Carlo	UniversitàPolitecnicadelle Marche, Ancona, Italy	67	2802	41.82	34
15	Koning, Frits	Leiden University Medical Center - LUMC, Department of Immunohematology and Blood Transfusion, Leiden, Netherlands	62	1949	31.43	36

4.8 Profile of Most Productive Journals

Fifteen highly productive journals publishing world research papers together contributed 2524 (17.58 percent) papers in celiac disease research during 2001-12. Table 7 shows the contribution of the most productive journals during the period 2001-2006, 2007-2012 and over all contribution. The cumulative publications share of these fifteen most productive journals showed an increasing trend in contribution on celiac research. Journal of Pediatric Gastroenterology and Nutrition is the highly productive journal with 278 (1.98 percent) publications, followed by American Journal of Gastroenterologyiswith 240 (1.67 percent) publications, Scandinavian Journal of Gastroenterology with 211 (1.47 percent) publications, Gut with 182 (1.27 percent) publications and Digestive Diseases and Sciences 177 (1.23 percent) publications. Gut has the highest impact factor (10.111) followed by American Journal of Gastroenterology (7.282),

Clinical Gastroenterology, and Hepatology (5.627), Endoscopy (5.21). Rest of the journals have less than 5 impact factor. (Table 7)

Table 7. Most Productive Journals in Celiac Disease Research

Rank	Title of the Journal	Number of Papers			%age	Impact Factor	Cited Half Life
		2001-06	2007-12	2001-12			
1	Journal of Pediatric Gastroenterology and Nutrition	125	153	278	1.94	2.298	6.9
2	American Journal of Gastroenterology	134	106	240	1.67	7.282	7.2
3	Scandinavian Journal of Gastroenterology	110	101	211	1.47	2.019	10
4	Gut	112	70	182	1.27	10.111	7.9
5	Digestive Diseases and Sciences	65	112	177	1.23	2.117	8
6	European Journal of Gastroenterology and Hepatology	110	66	176	1.22	1.757	7
7	World Journal of Gastroenterology	50	123	173	1.20	2.471	4.5
8	Digestive and Liver Disease	80	91	171	1.19	3.054	4.5
9	Gastroenterology	95	70	165	1.14	N.A	N.A
10	Alimentary Pharmacology and Therapeutics	52	91	143	0.99	3.769	5.8
11	Gastrointestinal Endoscopy	58	76	134	0.93	4.878	6.3
12	Journal of Clinical Gastroenterology	56	76	132	0.92	3.159	6.6
13	Journal of Vascular Surgery	43	88	131	0.91	3.21	7.1
14	Endoscopy	49	57	106	0.74	5.21	5.6
15	Clinical Gastroenterology and Hepatology	36	69	105	0.73	5.627	4.3

4.9 Profile of Highly Cited Papers

It is found that the ten papers have received more than 500 citations, besides this the citations count has been taken as the number of citations received by each papers since these published till August 2013. Table 8 presents the list of highly cited papers in CD. It is identified that he six papers have received more than 500 citations per publication. Table 8 given below shows the highly cited papers in CD research. The most frequently cited one is "*Standards of Medical Care in Diabetics – 2009",* which has been cited 1061 times. The second highest citations (957) received to paper title "Standards of medical care in diabetes-2011"

Table 8. Highly Cited Research Paper of CeliacDisease

Rank	Title	Source Title	Number of Citations
1	Standards of Medical Care in Diabetics – 2009	Diabetes Care 32 (SUPPL. 1) (2009) S13-S61	1061
2	Standards of medical care in diabetes-2011	Diabetes Care 34 (SUPPL.1) (2011) S11-S61	957
3	Prevalence of Celiac disease in at-risk and not-at-risk groups in the United States: A large multicenter study by A large multicentre study by Fasano, A et.al	Archives of Internal Medicine 163 (3) (2003) 286-292	752
4	Current approaches to diagnosis and treatment of Celiac disease: An evolving spectrum by Fasano, A., Catassi, C.	Gastroenterology 120 (3) 2001 636-651	716
5	Update on food allergy by Sampson, H.A.	Journal of Allergy and Clinical Immunology 113 (5) (2004) 805-819	684
6	Celiac sprue by Farrell, R.J., Kelly, C.P.	New England Journal of Medicine 346 (3) (2002) 180-188	605
7	Medical progress: Celiac disease by Green, P.H.R., Cellier, C.	New England Journal of Medicine 357 (17) (2011) 1731-1743	575
8	Structural basis for gluten intolerance in Celiac Sprue by Shan, L et. Al	Science 297 (5590) (2002) 2275-2279	569
9	Interleukin-10-secreting type 1 regulatory T cells in rodents and humans by Roncarolo, M.G et. al	Immunological Reviews 212 (2006). 28-50	568
10	Prevalence of celiac disease among children in Finland by Mäki, M et.al	New England Journal of Medicine 348 (25) (2003) 2517-2524	544

5 Summary and Conclusion

CD is the autoimmune disorder and more prevalent worldwide in males, females, children, middle aged and elderly people. However, more cases are found in female compare to males. A large numbers of cases remain undiagnosed because of its diverse appearance. It is advised that patients must consult dietitians for gluten-free foods, and must read the product labels before buying or consuming. Doctors advised that, a multivitamin should be taken daily and those have iron deficiency anemia should be treated with iron. Those patients have anemia due to folate or B12 deficiency should be treated with folic acid (Sainsbury, K. et. al., 2013). It is found that there was 14356 papers were published during 2001-

2012. However, during the period 2001-2006, total 8413 papers were published compare to 5943 papers during the 2007-2012. Growth of publications was increased in the year 2005, 2007, 2009, while it decreased considerably in the year 2003, 2004, (1.16 percent) in the year 2010. The highest ACPP was observed (3.12) in the year 2011. USA has been the most productive country on CD research which shared 19.68 percent of world publication. The USA publications have received a total 27973 citations on 9.79 average citations per publication. Italy is the second in the list of productive countries and contributed 12.94 percent of the total publications, which has received 31239 citations on an average 19.89 citations per publication. India only produced 2.08 percent of the total research out on celiac disease research, which is alarming because numbers of CD cases are being increased at rapid pace in the country. Lack of funding could be the prime reason in India for small amount of research in CD. Amongst the subjects contributing to CD research, the considerable CD research published in medicine 68.51 percent, followed by biochemistry, genetics and molecular Biology 9.88 percent, Immunology and Microbiology 5.18 percent. Adults population group have been the main focused area of research and researchers contributed 37.35 percent publications share, followed by middle aged people 22.96 percent of the total publication. UniversitàdegliStudi di Napoli Federico II, Naples, Italyis the most productive institution in celiac research which have contributed highest number of publication (231 papers; 6800 citations; h-index value 41). Study observed that MarkkuMaki from University Hospital of Tampere, Pediatric Research Center, Tampere, Finland is the most productive author who have contributed 157 publications and received 5250 citations on celiac research on an average 25.73 citations per paper. He has been h-index value 20 which is highest among all authors. Study has observed that the Journal of Pediatric Gastroenterology and Nutrition is the most productive with 278 publications which has received 1.98 percent share of the total publications, and its impact factor is 2.298. India is lagging behind in celiac disease research, and it is the responsibility of the leading organizations to foster the research in this field. Funding agencies should come forward to invite researchers, and scientists to foster research and development in celiac disease for the benefits of mankind.

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