The research hotspots analysis of diabetes mellitus and deafness by pubmed

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ABSTRACT

Objective: To understand the research hotspots of Diabetes Mellitus and deafness by PubMed. **Methods:** With MS Excel, SPSS, Cytoscape software, we took MeSH (Medical Subject Headings) word frequency analysis, clustering analysis, co-word network graph of PubMed papers. **Results:** It shows that the current Diabetes Mellitus and deafness research hotspots had focus on "Wolfram Syndrome, DNA; Mitochondrial; Hearing Loss, Sensorineural; Diabetes Mellitus; Deafness; Point Mutation", etc, also the most importance of which was "Point Mutation" of "DNA, Mitochondrial". **Conclusion:** It is helpful and timesaving for researcher or doctor to understand the research hotspots in Diabetes Mellitus and deafness.   © 2013 Trade Science Inc. - INDIA

KEYWORDS

Diabetes mellitus;
Deafness;
Word frequency analysis;
Clustering analysis;
Co-word network graph;
Point mutation;
DNA;
Mitochondrial.

INTRODUCTION

In recent years, the incidence of Diabetes Mellitus (DM) is growing rapidly worldwide, DM has become the third chronic diseases with serious threat to human health after tumor, cardiovascular disease. It is estimated that 366 million people had DM in 2011; by 2030 this would have risen to 552 million[1]. DM is a serious public health problem.

A large number of studies have shown that in recent years when DM peripheral neuropathy damage spreaded with the VIII cranial nerve, hearing loss could appear and even nerve deafness, it is seriously affects to patients' daily life[2].

The current research of DM and deafness mainly involve pathogenesis, it has guiding meanings to the treatment of DM. We hope that through this study the analysis of the subject headings can be drawn the research hot spot outline of DM and deafness.

Therefore this research retrieved the DM papers of PubMed (http://www.ncbi.nlm.nih.gov/pubmed), got 953 papers, and analyzed MeSH of above papers using Co-word Analysis[3].

MATERIALS AND METHODS

First, we retrieved PubMed papers with publication dates between 1966 and 3 October 2013. Second, search terms was ("Hearing Loss"[Mesh] OR "Deafness"[Mesh]) AND "Diabetes Mellitus"[Mesh].

FULL PAPER

Third, using Microsoft Excel we recorded All Major Topic MeSH (Majr terms) of above papers, and sort and filter the terms, and looked for the high frequency terms (occurrences), and we also counted occurrences of two high frequency terms together in the same paper, setting up the original co-word matrix. Fourth, the statistical analysis: we made Majr term's clustering analysis using SPSS13.0 statistical software, draw the co-word network graph of the high frequency terms using Cytoscape software[4].

THE MAJR TERMS ANALYSIS OF PAPERS ABOUT DM AND DEAFNESS

The Majr terms word frequency analysis

We retrieved 953 papers, all with MeSH terms,

TABLE 1 : The top 32 Majr terms about DM and deafness

Ranking	MeSH terms	Occurrences frequency (times)	percentage(%)	Cumulative Percent(%)
1	Wolfram Syndrome	275	8.0692	8.0692
2	Deafness	217	6.3674	14.4366
3	Diabetes Mellitus	173	5.0763	19.5129
4	DNA, Mitochondrial	153	4.4894	24.0023
5	Hearing Loss, Sensorineural	140	4.1080	28.1103
6	Diabetes Mellitus, Type 1	133	3.9026	32.0129
7	Diabetes Mellitus, Type 2	127	3.7265	35.7394
8	Point Mutation	84	2.4648	38.2042
9	Membrane Proteins	83	2.4354	40.6397
10	Diabetes Complications	80	2.3474	42.9871
11	Mutation	73	2.1420	45.1291
12	Optic Atrophy	66	1.9366	47.0657
13	Hearing Loss	59	1.7312	48.7969
14	Anemia, Megaloblastic	40	1.1737	49.9707
15	RNA, Transfer, Leu	36	1.0563	51.0270
16	Thiamine	31	0.9096	51.9366
17	Diabetes Insipidus	31	0.9096	52.8462
18	Mitochondrial Diseases	29	0.8509	53.6972
19	Hearing Loss, Sudden	25	0.7336	54.4308
20	Obesity	23	0.6749	55.1056
21	Diabetic Neuropathies	21	0.6162	55.7218
22	Membrane Transport Proteins	20	0.5869	56.3087
23	Mitochondria	20	0.5869	56.8955
24	Abnormalities, Multiple	18	0.5282	57.4237
25	Mutation, Missense	17	0.4988	57.9225
26	MELAS Syndrome	17	0.4988	58.4214
27	Retinitis Pigmentosa	16	0.4695	58.8908
28	Retinal Degeneration	15	0.4401	59.3310
29	Mental Disorders	15	0.4401	59.7711
30	Diabetic Retinopathy	12	0.3521	60.1232
31	Ear, Inner	12	0.3521	60.4754
32	Cochlea	11	0.3228	60.7981

we extracted Majr terms and established the Majr terms database. We got 32 Majr terms of DM and deafness which occurrences frequency was over 11 times. From TABLE 1, we can infered some ideas: the relevant research hotspots of DM and deafness mainly concentrated in the "Wolfram Syndrome, DNA; Mitochondrial; Hearing Loss, Sensorineural; Diabetes Mellitus; Deafness; Point Mutation", etc, it also suggests that "Point Mutation" of "DNA, Mitochondrial" has become most major research hotspots of DM and deafness ("Wolfram Syndrome" involves "Point Mutation" of "DNA, the Mitochondrial")[5].

Clustering analysis of the high frequency Majr terms

This research used hierarchical clustering analysis which is one of the most commonly used Classify analysis to analyze the top 17 Majr terms which occurrences frequency was over 30 times), drew a dendrogram,

and the results were shown in Figure 1.

From the Figure 1, we could seen the high frequency Majr terms could be divided into the following six groups. Group 1 contains Majr terms ("Anemia, Megaloblastic; Thiamine"), it suggests that thiamine-responsive megalo-
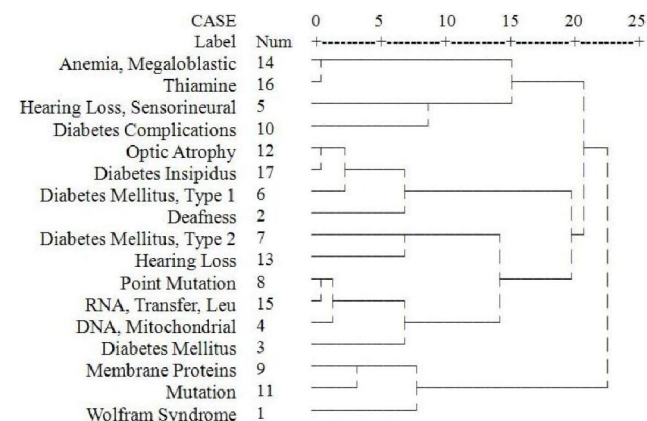

Figure 1 : Hierarchical clustering analysis dendrogram of Majr terms

TABLE 2 : The top 22 Majr terms pair

Ranking	MeSH terms A	MeSH terms B	Co-word occurrences frequency(times)
1	Deafness	Diabetes Mellitus	79
2	Deafness	DNA, Mitochondrial	72
3	DNA, Mitochondrial	Point Mutation	67
4	Wolfram Syndrome	Membrane Proteins	62
5	Diabetes Mellitus	DNA, Mitochondrial	61
6	Deafness	Diabetes Mellitus, Type 1	53
7	Deafness	Diabetes Mellitus, Type 2	46
8	DNA, Mitochondrial	Diabetes Mellitus, Type 2	40
9	Diabetes Mellitus, Type 1	Optic Atrophy	40
10	Deafness	Point Mutation	37
11	Diabetes Mellitus	Point Mutation	35
12	Deafness	Optic Atrophy	32
13	Diabetes Mellitus	Hearing Loss, Sensorineural	30
14	Wolfram Syndrome	Mutation	29
15	Membrane Proteins	Mutation	29
16	DNA, Mitochondrial	Mutation	27
17	Deafness	Diabetes Complications	26
18	Hearing Loss, Sensorineural	Diabetes Mellitus, Type 2	26
19	Hearing Loss, Sensorineural	Diabetes Mellitus, Type 1	24
20	Hearing Loss, Sensorineural	Diabetes Complications	23
21	Diabetes Mellitus, Type 2	Point Mutation	23
22	Diabetes Mellitus, Type 2	Hearing Loss	20

FULL PAPER

blastic anemia (TRMA) is with DM, anemia, and deafness, it is as a result of SLC19A2 mutations, SLC19A2 encodes a thiamine transport proteins, it is the only single genotype DM of vitamin dependent[6]. Group 2 contains Majr terms ("Hearing Loss, Sensorineural; Diabetes Complications"), it suggests that sensorineural hearing loss is one of DM complications. Group 3 contains Majr terms ("Optic Atrophy; Diabetes Insipidus; Diabetes Mellitus, Type 1; Deafness"), it suggests that Type 1 DM is easy with optic atrophy, Diabetes insipidus, deaf. Group 4 contains Majr terms ("Diabetes Mellitus, Type 2; Hearing Loss"), it suggests that Type 2 DM is easy with hearing loss. Group 5 contains Majr terms ("Point Mutation; RNA, Transfer, Leu; DNA, Mitochondrial; Diabetes Mellitus"), it suggests that attack of DM relate to point mutations[7], "RNA, transfer, leucine"[8], mitochondrial DNA[9]. Group 6 contains Majr terms ("Membrane Proteins; Mutation; Wolfram Syndrome"), it suggests that pathogenesis of Wolfram syndrome relate to membrane protein mutation[10].

The above clustering results suggest that several Majr terms within one group have certain inherent logic connection between eachother; If there are no known correlation between the Majr terms, it indicates we find a new research hotspot.

Co-word network graph of the high frequency Majr terms pair
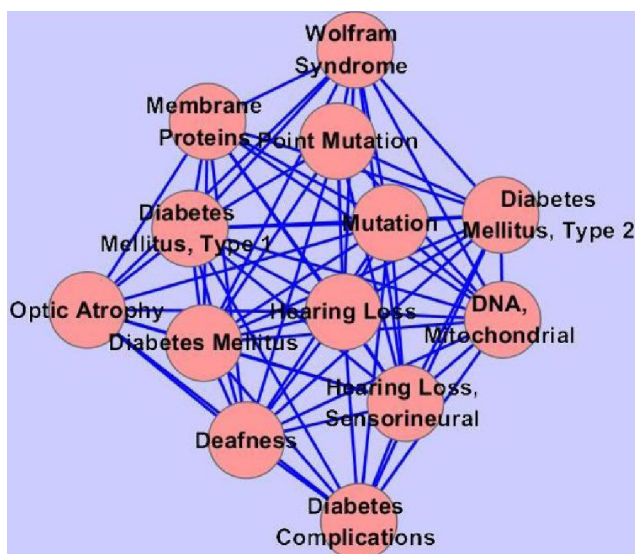
By analyzing the top 13 Majr terms which word

Figure 2 : Co-word network graph of the high frequency Majr terms pair

frequency were over 50 times, we got the top 22 Majr terms pair (A and B, see TABLE 2) and co-word network graph of the Majr terms pair (see Figure 2). Especially the first Majr terms pair of "Deafness" and "Diabetes Mellitus" appeared 79 times in the same paper, also the second MeSH terms pair appeared 72 times ("Deafness" and "DNA, Mitochondrial").

In Figure 2 the edge represents the concurrence relationship between Majr terms pair and if the edge between one Majr term to other Majr term, it suggests that the one Majr term is more important, it is in the center of the research hotspots. So we could infer that "Point Mutation" of "DNA, Mitochondrial" (Which is one of the pathogenesis of DM deafness) is the research hotspots of DM and deafness now.

CONCLUDING REMARKS

By analyzing MeSH terms (word frequency analysis, clustering analysis, co-word network graph) of PubMed papers about DM and deafness, we could infer that the current research hotspots of DM and deafness had focus on "Wolfram Syndrome, DNA; Mitochondrial; Hearing Loss, Sensorineural; Diabetes Mellitus; Deafness; Point Mutation", etc, it also suggests that the most importance of which was "Point Mutation" of "DNA, Mitochondrial"[11] (Which is one of the pathogenesis of DM deafness).

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FULL PAPER

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