AN EXPLORATORY ANALYSIS OF SEARCH INTEREST RELATED TO AUDIOLOGY TERMINOLOGY USING GOOGLE TRENDS TOOL

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ABSTRACT

The aim of the study is to analyze the popularity of audiology related terms using Google Trends (GT). All the search terms with respect to categories (conditions, terminology, & device), Google verticals (websearch, imagesearch, youtubesearch, & newssearch) and interest over time were analyzed in the span of five years. Results with respect to conditions, the search volume interest over time in Google verticals (Web search, image search, YouTube search & news search) revealed that 'hearing loss' yielded highest search volume followed by 'deafness', then by 'hearing impairment' and the least with 'hearing problem'. With respect to terminology, the search volume interest over time in Google verticals (web search, image search, YouTube search, & news search) revealed that 'deaf' yielded popular search volume followed by 'hard of hearing', and the least with 'hearing impaired'. With respect to devices, the search volume interest over time in Google verticals (web search, image search, YouTube search, & news search) revealed that 'hearing aids' yielded highest search volume followed by 'cochlear implant', and the least with 'hearing device'. Irrespective of categories, 'hearing loss' is showed higher interest in web search; the search term 'deaf' is popular in other Google verticals (image search, YouTube search & news search). The trend research platform can be used to explore different terminology over time and their drift in Google verticals with great acumen. This tool can be utilized in forecasting, modulating marketing strategies and make a key word planner.

Keywords: *Audiology; Terminology; Googletrends; Searchtrends; Search volume*

INTRODUCTION

Audiology is a field of study dealing with assessment, diagnoses, treatment, rehabilitation, and prevention of hearing and balance disorders (American Speech-Language Hearing Association). The global market of audiology is rising because of enormous growth in the number of inhabitants in age-related hearing loss (American Speech-Language Hearing Association). This stupendous growth might display higher prevalence of hearing loss that will drive the growth of audiology market over the figure timespan (Global Market Insights, 2018). Increasing in awareness, technological adoptions, technology expansions, and new product inventions will additionally witness the growth of audiology industry over estimated time frame (Global Market Insights, 2018). Also, hunting down health information, an activity that was at one time the essential area of elderly population, is presently the third most prominent online action for all web clients 18 and older (Zickuhr, 2010). In this innovation imbued period, the people are utilized to easy knowledge transfer than traditional reliance on information acquired from family doctors (Agree, King, Castro, Wiley, & Borzekowski, 2015). In hearing health care industry, hearing loss is a major area of concern which affects quality of life as well as ability to learn and earn. From the beginning of this century the insistent desire for health facts has driven people to pamper in web based online research. New tools are evolving to ease health care research in the huge Data era. Web seek information may give significant knowledge

patterns of disease and population search behaviour (Brownstein, Freifeld, & Madoff, 2009). In this way, a solid tool is required to measure the patterns in look made by changed geographic populaces comprehensively (Abedi, baye, Tsivgoulis, Male, Goyal, & Alexandrov, et al, 2015). One such tool that has changed the web based interactive search was developed by Google Inc., called Google Trends (GT©) (Google trends, 2016).

Google Trends (GT), a freely available online statistical portal of Google Inc delivers access to internet search forms by analysing a portion of all search queries on the Google Search website and other associated Google sites. The web portal also analyse the volume of searches for a user specified search term among all searches performed on Google Search. According to developer, the GT facilitates non-real time unbiased data of Google search data that can be drawn as far back as 2004 and up to 36 hours prior to the search made. The users may enter any specified search term and GT analyses the number of searches made for that particular search term relative to the total number of searches made on Google. The system automatically eradicates prejudiced data, providing reliable information. GT investigates the portion of the three billion data every day (Google trends, 2016).

GT analyses search queries relating to temporal changes in search volume (i.e., interest over time), global changes (i.e., search volume by globally/geographic region/city of choice), categories changes (i.e., entertainment, finance, health, games, travel, sports, science etc.), Google verticals (web, image, YouTube, News, Shopping), related queries and related topics for user-specified terms (Google (2014). Related queries mean that, users searching for particular term also searched for other related queries. Related queries can be sort by two metrics. One such types of 'related queries' on a per-annum basis is' top queries', which were the most popular trending; and the other one is 'rising queries' that displays the biggest increase in search frequency since the last time period. Results marked "Breakout" had a tremendous increase, probably because these queries are new and had few (if any) prior searches. The search results and comparisons can be filtered geographically, temporally, categorically, and by type of search. GT symbolizes interest over time as the relative search volume (RSV) for the given region and time, wherein the highest peak period within the queried timeframe is reported as RSV = 100. Search volume in GT is the traffic for a precise search term relative to all enquiries made in Google, normalized to range from 0 to 100 (Choi & Varian, 2012) with a value of 100 is the peak popularity for the term. A value of 50 means the search term is half as popular. A score of 0 means there was not enough data for this term. GT reports the RSV on daily or weekly time periods depending on the duration of the queried timeframe (Google trends, 2016). The analyser can also compare the RSV of up to five different search terms or the RSV of a specific search term between geographic areas and between time periods. The search input of multiple terms could be analysed in combination with ''+'' signs and terms can be omitted with ''-'' signs. To specify precise search phrases quotations can be used. In addition, the investigator also can select from 25 specific topic categories (i.e., entertainment, finance, health, games, travel, sports, science etc.) to restrict the search. The search output results can be downloaded by the user to conduct further analyses (Google trends, 2016).

Google Search engine account for more than 70% of market share in the web search engines industry as the health information seekers often initiate their web searches using Google search engine platform (Net Market Share, 2017). Recently, there has been an increasing use of the analysis of Internet activity to know the people's interest on various medical conditions (Bragazzi, et,al, 2016; Cho, et al. 2013; Gluskin, Johansson, Santillana, & Brownstein, 2014; Phelan, Kelly, & Kenny, 2014; Althouse, Allem, Childers, Dredze, & Ayers, 2014). Hence, the GT turns out to be a dependable platform for quantifying medical information on demand (Brownstein, Freifeld, & Madoff, 2009). In this scenario, the analysis of awareness profile and usage of audiology related terms on Google trends across the globe might contribute to the recognition of global hearing needs thereby direct policy makers in the development of further action plans. However, the volume and usage of appropriate terminology and its interest over time in audiology is not known which may interrupts communication with various professionals, diagnostic assessment, and documentation (Mullen, 2010). For these reasons, the analysis and comparison of standardized audiology terms in various Google verticals (web search, image search, YouTube search, & news search) across the globe and its interest over time is proposed. Such facts need to be studied among the general public/health

information seeker having common search interest with the best accessible data resources to quantify and evaluate the audiology related terminology. Further, the review of literature revealed, no previous works concerned with internet search trends for audiology related search terms. Hence, this study was conducted with an aim to investigate the changes in internet search volumes of audiology related terms as defined by the WHO.

MATERIALS AND METHOD

The investigator selected most common terminology related to the field of audiology as suggested by world health organisation (WHO). The criteria for choosing search words were: (i) words representing major areas of research in the field of audiology; (ii) words which are common to health information seeker (iii) words which have adequate search volume in Google Trends to perform the analysis (e.g. bone anchored hearing aids & analog hearing aids etc were discarded for this reason). The final 10 search words selected were grouped under three categories based on conditions (hearing loss; deafness; hearing problem; hearing impairment), terminology (deaf; hard of hearing; hearing impaired), device (hearing aids; cochlear implant; hearing device). Though these search words not represent the complete picture of terminology in the field of audiology, each search word signifies a real-world, commonly used in the field of audiology that itself an explanatory for the purpose of the study. To understand the search word interest of health information seeker, investigator exported global data concerning search words from all categories and its interest over time across Google verticals. The period of interest was chosen for 5 years, starting from 17th March 2013 until 16th March 2018. All the searches were performed on the same day. The analysis was successful in computing real-time data over time and did not show a need for statistical analysis. Hence, the outcome was displayed using "search volume index graphs" as enumerated by GT. A screenshot of all these data points was taken at the time of analysis for record keeping purpose.

RESULTS

The results of the study revealed interesting facts. Figure 1- 12 shows normalised search data over 5 years period, starting from 17th March 2013 until 16th March 2018.

Interest over time is depicted as numbers which represent search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term.

Figure 1-4 shows the RSVs of the search terms related to 'conditions' namely 'hearing loss', 'deafness', 'hearing impairment', and 'hearing problem', of which 'hearing loss' yielded highest search volume followed by 'deafness', then by 'hearing impairment' and the least with 'hearing problem' across all Google verticals such as Web search, image search, YouTube search and news search (Figure 1-4).

Figure 5-8 represents the RSVs of the search terms related to 'terminology' namely 'deaf', 'hearing impaired', 'hard of hearing' where the highest RSV was presented by 'deaf' followed by 'hard of hearing', and the least RSV presented with search term 'hearing impaired' across all Google verticals such as web search, image search, YouTube search, and news search.

Figure 9-12 denotes the RSVs of the search terms related to devices namely 'hearing aids', 'cochlear implant', 'hearing device' of which 'hearing aids' yielded highest search volume followed by 'cochlear implant', and the least with 'hearing device' across all Google verticals such as web search, image search, YouTube search, and news search.

Figure 13 depicts average peak popularity of search terms on 'web search' irrespective of categories. The search terms like 'hearing loss' (75), 'hearing aid' (74) are more than half as popular (>50) and 'deaf' is half as popular (=50). Remaining search terms 'deafness' (20), 'cochlear implant' (19), 'hearing impairment' (6), 'hearing problem'(3), 'hearing impaired' (3), 'hard of hearing' (2), and 'hearing disorder' (2) are less than half (<50) as popular.

Figure 14 illustrates the average peak popularity search terms on 'image search' irrespective of categories. The search terms like 'deaf' (71), 'hearing aid' (59) are more than half as popular (>50). Other terms like 'hearing loss' (41), 'cochlear implant' (25), 'deafness' (15), 'hearing impairment' (8), 'hearing problem' (3), 'hearing disorder' (3), 'hearing impaired' (2), and 'hard of hearing' (1), and are less than half (<50) as popular.

Figure 15 depicts the average peak popularity of search terms on 'YouTube search' irrespective of categories. The search terms like 'deaf' (46), 'hearing loss' (31), 'hearing aid' (20), 'cochlear implant' (17), 'deafness' (11), 'hearing impairment' (3), 'hearing problem' (3), 'hearing disorder' (1) are less than half (<50) as popular. Not enough search data was seen for 'hearing impaired' (0), and 'hard of hearing' (0).

Figure 16 shows the average peak popularity of search terms on 'news search' irrespective of categories. The search terms like 'deaf, (35) 'hearing aid' (24), 'hearing loss' (15), 'cochlear implant' (6), 'deafness' (3), 'hearing impairment' (2), 'hearing impaired' (2), 'hearing disorder' (1) are less than half (<50) as popular. Not enough search data was observed for 'hearing problem' (0), and 'hard of hearing' (0).

The gradual increase in the popularity of search terms 'hearing loss' and 'hearing aid' was observed in two of the Google verticals like web search and image search.

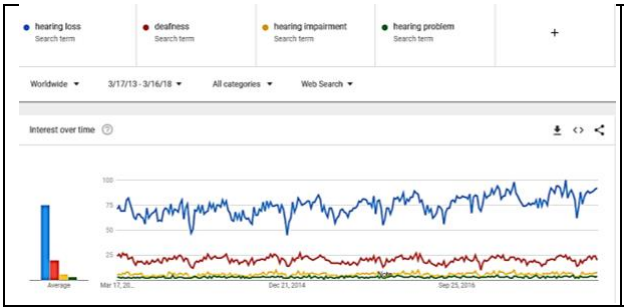

Figure 1. Comparative relative search volumes of hearing loss, deafness, hearing impairment, hearing problem in web search

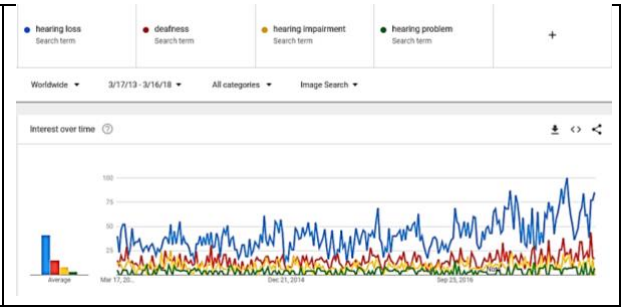

Figure 2. Comparative relative search volumes o f hearing loss, deafness, hearing impairment, hearing problem in image search

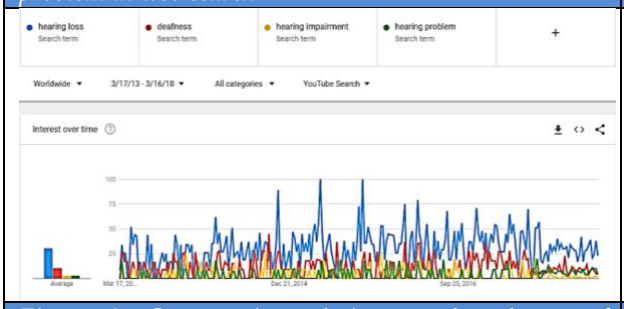

Figure 3. Comparative relative search volumes of hearing loss, deafness, hearing impairment, hearing problem in YouTube search

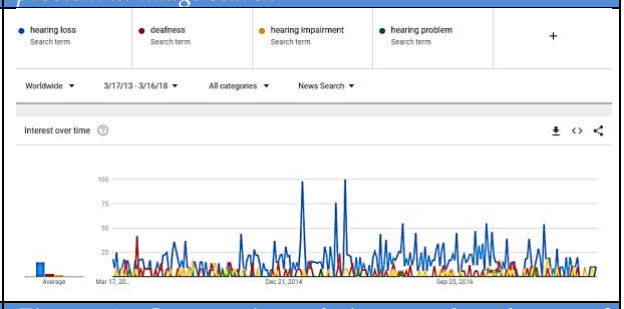

Figure 4. Comparative relative search volumes of hearing loss, deafness, hearing impairment, hearing problem in news search

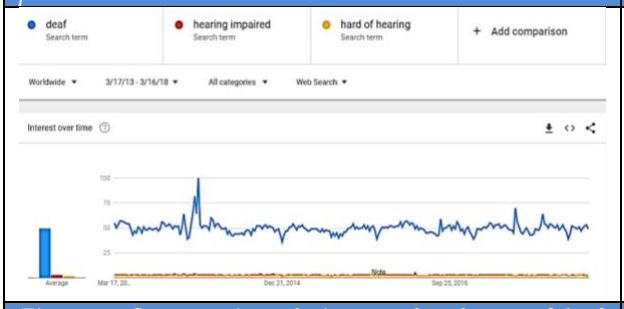

Figure 5. Comparative relative search volumes of deaf, hearing impaired, hard of hearing in web search

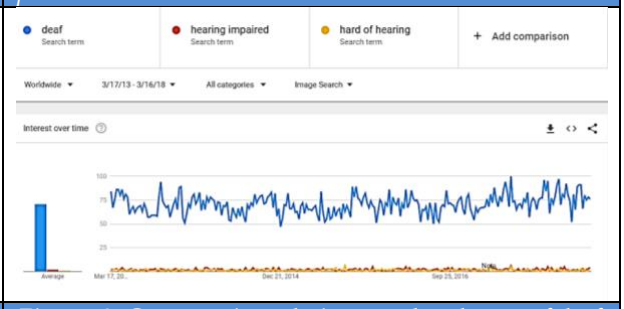

Figure 6. Comparative relative search volumes of deaf, hearing impaired, hard of hearing in image search

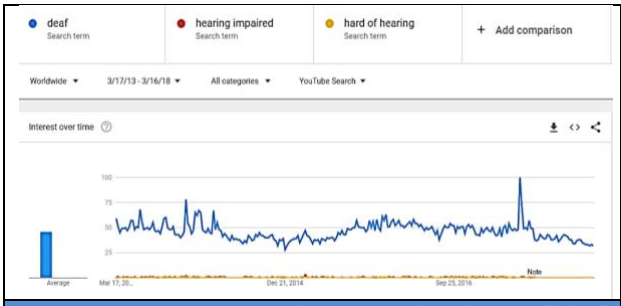

Figure 7. Comparative relative search volumes of deaf, hearing impaired, hard of hearing in YouTube search

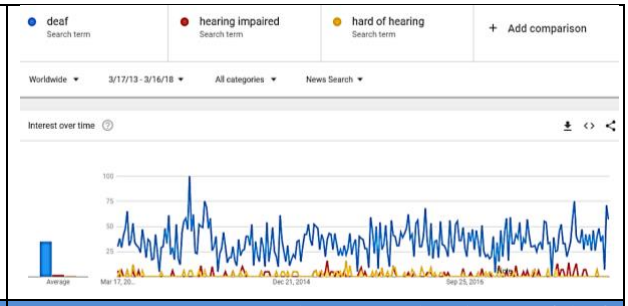

Figure 8. Comparative relative search volumes of deaf, hearing impaired, hard of hearing in news search

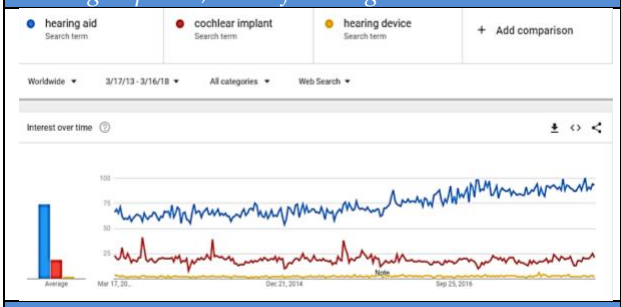

Figure 9. Comparative relative search volumes of hearing aid, cochlear implant, hearing device in web search

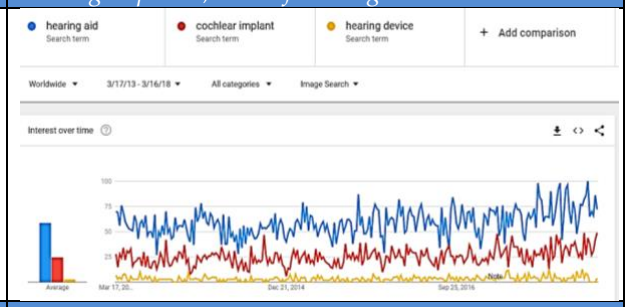

Figure 10. Comparative relative search volumes of hearing aid, cochlear implant, hearing device in image search

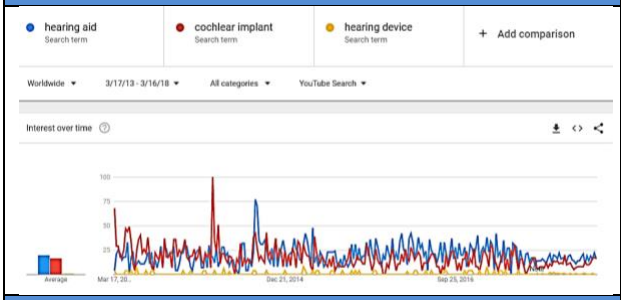

Figure 11. Comparative relative search volumes of hearing aid, cochlear implant, hearing device in YouTube search

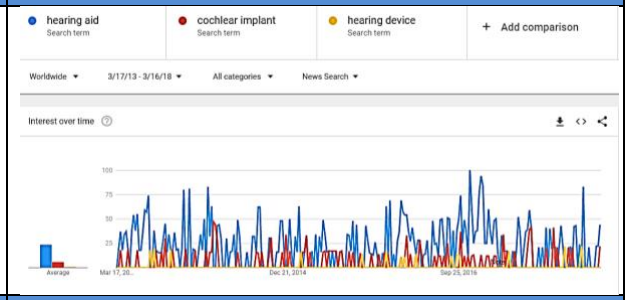

Figure 12. Comparative relative search volumes of hearing aid, cochlear implant, hearing device in news search

Note: The horizontal axis of the main graph represents time and the vertical axis shows how often a term is searched for relative to the total number of searches, globally.

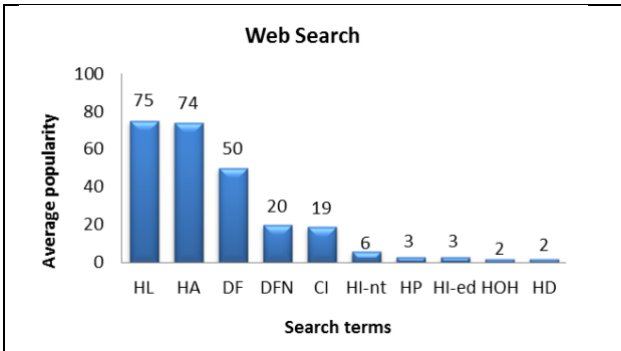

Figure 13. Average peak popularity of search terms irrespective of categories on web search

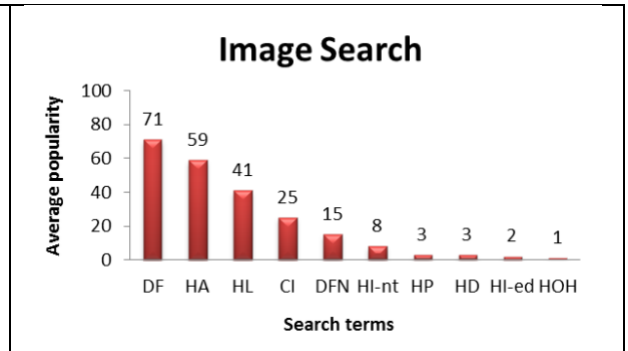

Figure 14. Average peak popularity of search terms irrespective of categories on Image search

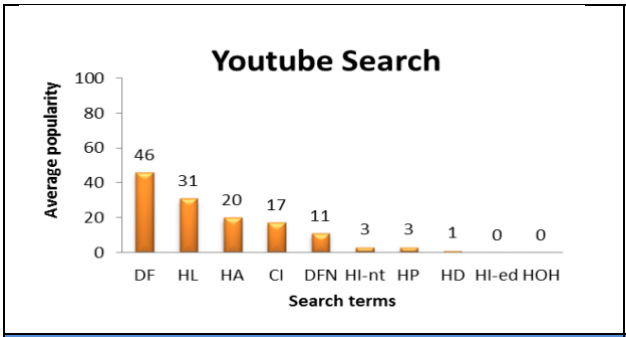

Figure 15. Average peak popularity of search terms irrespective of categories on YouTube search

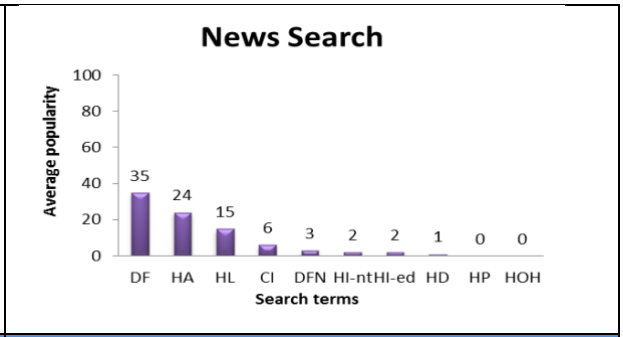

Figure 16. Average peak popularity of search terms irrespective of categories on News search

Note: **HL** – Hearing Loss; **HA**- Hearing Aid; **DF**- Deaf; **DFN** – Deafness; **CI**- Cochlear Implant; **HI-nt** – Hearing Impairement; **HP**- Hearing Problem; **HI-ed** – Hearing Impaired**; HOH** – Hard of Hearing; **HD** – Hearing Device

DISCUSSION

In the present study it was eminent that the term 'hearing loss' is most popular than the counterparts of 'conditions' in web search, image search, YouTube search and news search. This is in par with earlier findings that have analysed the list of keywords and reported the search prevalence in hearing healthcare (Cooling, 2014). From this study (Cooling, 2014), it can be said that the search prevalence of keyword 'hearing loss' is highest (450,000) and least with 'hearing problems' (74,000). With respect to 'terminology', the search term 'deaf' is more popular than its counterpart search terms in web search, image search, YouTube search and news search. This might be due to sharing and watching of viral videos titled 'deaf people hear for the first time' on social media, search engine and YouTube (The Atlantic, 2014). The search term 'hearing impaired' is less popular compare to the 'deaf'. This may be due to less acceptances and no longer usage by most of the deaf community and hard of hearing people. For many people, the words "deaf" and "hard of hearing" are viewed as positive. Instead, the term "hearing-impaired" is not viewed as positive (National Association of the Deaf). Among the device category, 'hearing aid' has shown peak popularity compare to their counter search terms across Google verticals. This can be supported with earlier investigation done by cooling (2014). He stated that, the keyword 'hearing aid' has highest search prevalence (823,000) and least with hearing device (135,000). Another fact is that the global audiology market is growing due to increase in population of age related hearing loss (American Speech-Language Hearing Association).

Another important finding irrespective of categories revealed that the search terms 'hearing loss', 'hearing aid', 'deaf' are more than half as popular than other search terms in web search. This gives us hint that health information seekers use web search platform to know the information about hearing loss and hearing aid. Similarly the search terms 'deaf', 'hearing aid' is more than half as popular in image search irrespective of categories. In contrast, YouTube search and news search hosting the search terms less than half as popularity with term 'deaf' placing in top position. The reason behind the search term 'deaf' placing in top position by image search, YouTube and news search is due to its popularity of this particular term in viral videos which relates to deaf people.

The collective data revealed that the use of reliable terminology is a fundamental factor to improve terminology issues in audiology. Besides, improving hearing healthcare service quality and effective communication among professionals, clinicians, patients, and administrators depends on the use of consistent terms.

CONCLUSION

The present study has used robust everyday general key search words, key search words that will be explored as long as people have hearing related problems. We need to review these keywords

frequently (ex: hearing aid/hearing device/cochlear implant) and attempt to catch up the information on short tail keyword phrases (ex: hearing aid cost/hearing aid price) or long tail keyword word phrases (ex: where to get hearing aid/what is an hearing aid) that health information seekers are looking for, thereby rewrite or rephrase articles on the website or blog or vlog or forums or social media or online communities that meet those needs. Google Trends offer meaningful insights about populace search data and its relation to health and health care. Hence, the tool has a potential value as a free means to access large population search data. However, GT would have to be more transparent to be reliably used as a research tool in health care research so that it would make fidelity in the output analysed. On the other hand, the trend research platform can be used to analyse various search terms, its interest over time and their bank in Google verticals with great intuition. This tool can be used in predicting, harmonize marketing strategies and prepare a key word planner. However, Google Trends was not particularly fashioned for content marketers and search engine optimizations (SEOs). Indeed, no other tool that provides latest data on what's trending in search a moment ago.

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