A CORPUS-BASED STUDY OF COHESIVE CONJUNCTIONS IN MEDICAL RESEARCH ARTICLES WRITTEN BY IRANIAN AND NON- IRANIAN AUTHORS

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Abstract. *Conjunctions are linguistic signposts whose main objective is to restrict the interpretation of semantic relations which play a pivotal role in the intertextuality of discourse created by text producers/language learners. As such, this study sought to investigate the use of conjunctions in medical articles written by Iranian and non-Iranian authors with different nationalities. To this end, two targeted corpora of medical research papers were collected using a purposive sampling method. Each corpus comprised 400 articles. Subsequently, the frequency of conjunctions and their respective tokens were identified based on the taxonomy provided by Halliday and Hasan (1976). The analysis of the data based on frequency count and chi-square analysis revealed that there was no statistically significant difference between the types and their tokens in the two corpora. Alternatively, the findings demonstrated that in both corpora additives were most frequently used, while temporals were employed minimally. In addition, in the corpora related to non-Iranian authors, adversatives ranked second whereas casuals took the third place. Similarly, in the Iranian corpora casuals were ranked second and adversatives occupied the third frequency rank. Notably, the present study may have practical implications for both medical students and writers as well as EFL/ESL learners.*

Key words: *cohesion, cohesive devices, medical research paper, cohesive conjunctions*

1. INTRODUCTION

According to Halliday and Hasan (1976:1-2), text refers to "any passage, spoken or written, of whatever length, that forms a unified whole" and is "best regarded as a semantic unit whose linguistic features can be identified as contributing to its total unity and texture". Generally speaking, the features of a given text or its texture materialize the cohesive relations underlying its very foundation. Cohesion is a distinguishing factor between texts and non-texts and makes it possible for readers or listeners to set up relevance between what has previously been said, is being said, and will be said, by the means of appropriate and necessary lexical and grammatical cohesive devices. When semantic interpretation of a specific linguistic element in discourse is dependent on another, cohesion occurs. In other words, cohesion is the "foundation upon which the edifice of coherence is built" (Halliday and Hasan, 1985: 94) and is "an essential feature of a text if it is judged to be coherent "(Parsons, 1991: 415; Castro, 2004: 215). Similarly, Cox et al. (1990) in Palmer (1999) said that "cohesion

is important both to the reader in constructing the meaning from a text and to the writer in creating a text that can be easily comprehended" (p. 49). In addition, cohesion refers to the linguistic features which change a sequence of sentences to a text. It is present in a text through the use of devices that connect sentences. According to Connor (1984), it is defined as the use of explicit cohesive devices that indicates relations among sentences and different parts of a text. Cohesion is about the ways which connects components of a text together. In brief, it is a relationship between lexical items and structures which are inter-related to build a unified text. Cohesion is also one among the seven standards of textuality according to de Beugrande and Dressler (1983) in Trebits (2009) (The seven standards of textuality are as follows: cohesion, coherence, intentionality, acceptability, informatively, situationality and intertextuality.) Cohesion is achieved by the means of grammatical and lexical forms. Grammatical cohesion includes reference, substitution, ellipsis and conjunction while lexical cohesion includes reiteration and collocation.

Such categories of cohesion help construct texture or the feature of being a text. Coherence, on the other hand, according to McCagg (1990) refers to the logical relationship of ideas which is manifested through a semantic property of textuality. Differently stated, coherence is an aspect of comprehension that is established in the mind of the reader following relatedness among a text's propositions and between the text and the world knowledge that the reader possesses. According to Halliday and Hasan (1976), while coherence might depend on external factors such as the background of the reader and context of the situation, it may also be dependent on textual cohesion. Alternatively, they also explain that a text can achieve coherence even without inter sentence cohesion, so long as semantic clues are available for readers to come into intended meaning from their background knowledge. Consequently, coherence may also be linked to the reader's prior knowledge or what they know about the topic, and sometimes, on their cultural background.

Indubitably, comprehension problems may arise when the background knowledge on the relatedness of sentences in a text is limited. In such cases, readers rely much on a coherent text with appropriate explicit cues to make up for lack of prior knowledge. A text is coherent when a reader understands the function of sentences that come one after the other in the development of its overall or global meaning. Widdowson in (Wikborg, 1978). However, in order to understand the significance of cohesive devices as grammatical and lexical structures, considering their contribution in the meaning-making process of the text is too important. Although text is mostly considered as a product of combining sentences, it is a materialization of meaning represented by sentences. The meaning or "what is meant" is selected from a set of alternatives that constitutes meaning. Therefore, meaning can be represented through various forms of grammatical structures, but the selection occurs on the basis of the best option that can construct meaning most efficiently. This is due to the fact that text is not only viewed as a linguistic form but also a means for social interaction. When students write articles as course requirement, they need establishing clear relations between one sentence and most important factors they need to create a good text. They need to connect statements together in an appropriate and comprehensible way. Good articles have explicit connections among their different parts, so that what is being said, and what has already been said and is going to be said connect in the most fluent, clear and appropriate way. And for readers to follow a writer's intended meaning, they need to connect their sentences to each other by the use of cohesive markers. Cohesive conjunctions are usually placed at or near the beginning of sentences so that they can guide readers where the text is going whether in the direction it was moving, or in a new direction (Bowen & Cali, 2013). Overall, cohesive

conjunctions give the cue to readers if the text is certifying a previous sentence or paragraph, making further comment to it, providing an example for it, or making a generalization from it.

This study adopts the taxonomy of cohesive relationship provided by Halliday and Hassan to establish relationship within a text. According to Halliday and Hasan (1976), cohesive devices in ELT taxonomy of categories and subcategories are as:

1) Grammatical cohesive devices including:
   1. Reference: pronominal, demonstratives, comparatives
   2. Substitution: nominal substitution, verbal substitution, clausal substitution
   3. Ellipsis: nominal ellipsis, verbal ellipsis, clausal ellipsis
   4. Conjunction: additives, adversatives, causal, temporal, conditional and
2) Lexical cohesive devices including: Reiteration and collocation.

Conjunctions as one group of grammatical cohesive devices consist of additives, adversatives, causals, conditionals, and temporal. These connective forms express the implicit relationships between clauses. Additive is a semantic relationship in textness which is based on the notion of "and", while adversative is a relation based on the notion of "contrary to expectations". Causal is a relationship containing general and specific causal relations including those of result, purpose and reason. Temporal indicates a relation of sequence in time. According to them, additives can have four types – simple (e.g., and), complex emphatic (e.g., furthermore, in addition, moreover, additionally), appositive (e.g., that is, for instance, thus, for example) and comparative (e.g., likewise, conversely, similarly). Adversative can be divided into the adversative proper (e.g., however, although, though, but), the contrastive (e.g., in fact, on the other hand), the dismissive (e.g., in any case), and the corrective (e.g., on the contrary). Causal relation can be generally stated by therefore, consequently, so, hence, that of reason (on this account, for this reason), that of result (as a result, in consequence) and that of purpose (with this in mind, for this purpose), conditional (under the circumstances) and respective (with regard to this, in this respect). The different types of temporal are simple (before that, afterwards, earlier, previously, then), conclusive (at last, finally, in the end), sequential (first… then, first… next, secondly, first… second) and summary (in short, to sum up, briefly)(Gholami, et al. 2012, p. 294).

One of the most important aims in writing in an academic environment like medicine is creating texts that are coherent and cohesive to bring about successful communication in academic community. Regarding this issue, the use of different cohesive devices has always been of great interest for researchers and language teachers involved in the study and teaching of academic writing (Connor, 1984; Francis, 1989; Hinkel, 2001; Scarcella, 1984). Furthermore, these cohesive devices are often the focus of classes that have set as their aim the improvement of the academic writing skills of learners of English as a second or foreign Language (ESL, EFL). ESL and EFL learners and teachers often examine different ways to create cohesion in writing by the assistance of different lexico-grammatical features such as nouns, conjunctions, and adverbial phrases, among others.

Conjunctions are the most obvious clues for restricting the interpretation of a semantic relation in order to be well understood (Dooley & Levisohn 2001). Conjunctions are one of the most important obvious markers of coherence. In this research the researcher will investigate medical articles written by Iranian and non-Iranian authors to get a deeper insight into cohesive conjunctions that are mostly used in medical articles. The researcher will also make a comparison between these two corpora. Investigating how these features function in an academic text to create cohesion may lead to new developments for the teaching of English for specific purposes.

In order to gain more insights into the issues surrounding cohesive devices used by native and non-native authors in writing medical papers, the present study investigates the use of conjunctions as one category of grammatical cohesive devices in medical papers written by native and non-native authors in the years 2008-2011 in international journals. In this study the writer has sought the answer to these two questions.1) Which cohesive conjunctions in the introduced corpora (medical articles written by Iranian authors and medical articles written by non- Iranian authors) have a higher frequency? 2) Is there any meaningful difference in using cohesive conjunctions in the two sets of articles (medical articles written by Iranian authors and medical articles written by non- Iranian authors)? And based on the above questions these hypotheses have been formed: 1) There is no difference in the frequency of the use of cohesive devices in both corpora. 2) There is no meaningful difference in the frequency of using cohesive conjunctions in medical articles written by Iranian authors and medical articles written by non- Iranian authors).

2. REVIEW OF LITERATURE

While investigating the texts we see that cohesion has always been one of the most producing areas, regarding theoretical sources (Halliday and Hasan 1976, Brown and Yule 1983, Gutwinski 1976, Hoey 1983, 1991, Thompson 2004). Cohesion was introduced by Halliday & Hasan (1976) and since that time cohesion analysis has undergone a large number of studies. Function of cohesion in text analysis has been the target of study in most of them. The findings mostly showed that there was no significant relationship between the quality of cohesive devices used and the quality of writing.

Vahiddastjerdi and Taghizadeh (2006) investigated application of cohesive devices in Persian texts and their translation to English in contrast. They examined use of discoursal elements in Saadi's Gulistan. The results of their study revealed some differences, even among the very English versions.

Trebits (2009) investigated the use of conjunctions in the documents of the EU with the help of corpus linguistic techniques using the Corpus of EU English. A detailed analysis of cohesive sub-types revealed that additives were by far the most frequent devices of conjunctive cohesion, followed by temporals and causals. Adversative, clarifying and hypothetical conjunctions were found to be much less frequent in the texts of the CEUE, and the least frequently used were continuatives.

Rostami Abu-Sa`eedi (2010) analyzed cohesive ties in writings of foreign language students. He explored cohesive devices that had higher frequencies. He had surprising findings. Poor students had low density of cohesion, because they were not able to combine sentences together in a coherent way, e.g. by the use of conjunctions. So, he came to the conclusion that, in his study, conjunctions cannot discriminate good and poor students. Also, additives and temporals had a higher frequency in both groups. Furthermore, adversatives were as frequent as causals.

More recently, Yang & Sun (2012) investigated the use of cohesive devices in argumentative writing by Chinese sophomore and senior EFL learners. The results of ellipsis and substitution analysis showed that the two devices were more frequently found in spoken language and rarely were used in formal written discourse. About 56.67% of the sophomores and 70% of the seniors had not used ellipsis and substitution; because they had become aware of the inappropriateness of using ellipsis and substitution in formal writing.

Bikelienė (2012) analyzed text connectors in the Lithuanian EFL and native students' argumentative essays. The application of methods of Contrastive Interlanguage Analysis and statistical data analysis produced results on the overt marking of semantic relations in the Lithuanian EFL students' writing. Overall statistically significant overuse and the use of connectors in a non-preferred sentence or text position were observed. The results indicated that a correlation between a writer's language level and maturity, and connector frequency could be characterized by opposing tendencies. In relatively 'more simple' semantic categories, the observed relationship was inverse, while in 'more complex' categories – direct. The study also showed some differences between the use of connectors by the Lithuanian EFL learners and learners with different mother tongue backgrounds. Despite the observed differences in connector usage, the results allow us to hypothesize about an almost universally used model of argumentation.

Ahangar, et al. (2012) investigated conjunctions in Iranian sport live radio and TV talks. It was observed that associatives had the highest frequency, while adversatives were the least frequent. Additives, adversatives, and developmental markers held a meaningful difference between their employments in the corpus.

Gholami, et al. (2012) investigated conjunctions as one category of grammatical cohesive devices in research papers on biomedicine and applied linguistics written by Iranian authors. They found that conjunctions were used more frequently by biomedical researchers than applied linguistic ones. The study also revealed that both biomedical and ELT researchers tended to employ these linking words in non-sentence initial positions rather than in sentence initial positions.

Ketabi and Jamalvand (2012) analyzed and compared cohesive devices in four English international law textbooks and their Farsi translations. The results revealed that both ELTs and FTTS share more similarities than differences in the use of cohesive device of conjunction.

Centonze (2013) investigated conjunctions by ELF speakers, five interviews and five conversations in multicultural academic contexts and analyze the number of instances for each type of conjunction (additive, adversative, casual, temporal as well as continuatives). The obtained results showed that conjunctions were more likely to occur in conversational settings rather than in interviews: the prevalent conjunction type being additive and accompanied by coordination tags, such as *er*, I mean yeah,. They also found that ELF speakers in academic contexts usually do not use the entire 'conjunctive repertoire' at their disposal, but rather seem to take advantage of certain patterns of conjunctions rather than others, and consequently it limits the options available in a sort of hybridization process of conjunctions.

Zoghi (2013) compared the frequency of the use of lexical ties in English Medical Sciences (EMSs) articles written by Iranian and native writers. The results indicated that there was not a statistically significant difference in the use of lexical ties in abstracts, introduction and discussion and conclusion sections of EMSs articles.

Davatgari Asl and Shendi (2013) conducted a comparative analysis of cohesive conjunctions use in the weather forecast of native and non-native reporter. The Cohesive devices (reference, conjunctions, substitutions /ellipsis, lexical cohesions) were identified in both texts and then conjunctions were chose from 2 texts to compare with each other from 2 points of view: 1) type of cohesive conjunctions which are used in two texts and 2) frequency of them. Findings of the study showed differential uses of cohesive conjunctions in2 texts and more uses of some cohesive conjunctions in non-native English speaking reporter. Rahman (2013) also examined college-level Arabic L1 users' command of cohesive devices by

exploring the extent to which Omani student-teachers of English and native English speakers differ in their use of cohesive devices in descriptive English writing The results of the study indicated that there was a notable difference between the natives' and the students' use of cohesive devices in terms of frequency, variety, and control.

Ekaterina Lapshinova and Kerstin Kunz (2014) focused on the corpus-based analysis of conjunctions as intra- and intersentential links in texts which play an important role in text organisation. The results showed that we are able to achieve over 70% of precision and recall. It was also found that most problematic cases are caused by conjunctive adverbials, and their automatic identification is especially challenging as some forms can serve different non-cohesive and cohesive functions.

Kunz and Lapshinova-Koltunsk (2014) contrasted strategies of cohesive conjunction in English and German system and text. Using theory-informed methodologies they contrasted the resources available in the two languages for explicitly establishing conjunctive relations of cohesion. Moreover, they discussed the first findings from their analysis of an English - German corpus of translations and originals, which revealed differences in the textual realizations in terms of frequencies and functions.

Mohammed (2015) examined the use of various forms of conjunctions in the writings of students in English as Second Language situations. Results showed a significant difference in the use of `and` between high and low rated texts. The conjunctive `and` was seen to have a less unifying function, it was therefore avoided in the high rated texts but vigorously utilized in the low rated ones. In addition, the study further revealed that there was no significant difference in the use of other conjunctives. In a similar study, Fallah and Rahimpour (2016) investigated the influence of cohesion on readability and as a result, on comprehensibility of the texts. The results showed that although there is no significant difference between the use of cohesive devices in three groups of translations, the texts translated by SaTs were more difficult to read and less comprehensible than the texts translated by ST and GT.

In another study Rostami, et al. (2016) compared and contrasted the frequency of the use of cohesive devices in Iranian pre-university EFL textbook and in the headway as an EFL institute textbook. The results of one-way ANOVA illustrated that there were significant differences among the frequencies of grammatical cohesive sub- devices across Iranian pre-university and headway textbooks. Moreover, the result of chi-square test indicated that there were significant differences among the frequencies of lexical cohesion sub-devices across Iranian pre-university EFL and headway textbooks.

And in this study as it was mentioned before, the researcher aims to compare the use of conjunctions in research articles of medicine written by Iranian and non- Iranian authors in a corpus of 700 medical papers by adopting the taxonomy of cohesive relationship provided by Halliday and Hassan to establish relationship within a text. The researcher compares the use of cohesive conjunction in these two sets of medical articles to find out which cohesive conjunctions have a higher frequency, whether there is concordance between these two sets of high-frequent cohesive conjunction, and if there is any meaningful difference in using these cohesive conjunctions in the two corpora.

3. RESEARCH METHODOLOGY

3.1. Data collection

Two corpora were used in this study. One corpus was made up of published medical research articles written by Non-Iranian authors and the other was a corpus of medical research articles written by Iranian authors. Table 1 presents information about the corpora size and sampling.

Table 1 Description of Two Corpora

Corpus	Number of articles	Number of words
Non-Iranian authors	400	4,505,492
Iranian authors	400	1,588,430

Non-Iranian medical articles corpus consists of 400 articles published between the years 2009 and 2015. They are mainly from journals like Trends in genetics (TIG), Nature Reviews, Genetics and Alzheimer's & Dementia: The Journal of the Alzheimer's Association. The Researcher downloaded these articles from ncbi.nlm.nih.gov/pubmed. It consists of 4,505,492 words. Iranian medical articles corpus consists of 400 articles published between the years 2009 and 2015. They are mainly from journals like International Journal of Preventive Medicine, Journal of Research in Medical Sciences, and DARU Journal of Pharmaceutical Sciences. They were downloaded from ncbi.nlm.nih.gov/pubmed, too. This corpus has 1,588,430 words.

3.2. Data analysis

This research adopted the following methodology to investigate the use of cohesive conjunction in a corpus that consists of two sets of medical articles, one comprised of medical articles written by Iranian authors and the other comprised of medical articles written by non- Iranian authors, to find out which cohesive conjunctions had a higher frequency, whether there was concordance between these two sets of high-frequent cohesive conjunction, and if there was any meaningful difference in using these two sets of cohesive conjunctions in the two sets of articles.

First, the researcher built the medical corpus. Medical articles were downloaded through Pub Med that is a free full-text archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health's National Library of Medicine (NIH/NLM), they were in PDF format and the researcher converted them to text format, in order to be recognizable for the next tool that was used in this study, AntConc. For converting Aiseesoft PDF Converter Ultimate Version 3.2.6 was used.

Quantitative Analysis

Drawing on Halliday and Hasan (1976), Table 2 presents some conjunctive words and expressions that enter into cohesion:

Table 2 Types of Conjunctions

Types of conjunctions			
Additive	Adversative	Causal	Temporal
simple:	*proper*:	*general*:	*simple*:
and, nor, or	yet, but, however	so, because of, thus	then, next, afterwards
complex:	*contrastive*:	*specific*:	*complex*:
moreover,	but,	for this reason,	at once,
	on the other hand,	as a result,	this time, the last time,
In addition,	actually, in fact,	for this purpose	meanwhile,
besides that,	at the same time		at this moment,
additionally			until, then
comparative:	*corrective*:	*conditional*:	*sequential/conclusive*:
likewise,	instead,	then, under the	at first, in the end;
similarly,	on the contrary,		
on the other hand	at least	circumstances	finally, at last
appositive:	*dismissive*:	*respective*:	*summarizing:*
I mean,	in any case,	in this respect, with	here and now
in other words,	anyhow	regard to this,	up to now,
for example,	at any rate	otherwise	up to this point;
Thus			to sum up,
			briefly

In the case of This study 120 conjunctions were selected and according to Haliday and Hassan's Model divided to four sub-types; Additive, Adversative, Causal and Temporal.
The conjunctions of each sub-type are listed below:

Table 3 Classification of 120 Selected Conjunctions to for Sub-type Cohesive
Conjunction Groups

Additive	*and, also, as well, nor, neither, either, or, or else, nor, further, furthermore, in addition, besides, additionally, moreover, and another thing, add to this, alternatively, in other words, incidentally, by the way, that is to say, that is, I mean, in other words, for example, for instance, likewise, similarly, in the same way, on the other hand, by/in contrast, conversely*
Adversative	*yet, though, only, but, nevertheless, however, despite this, all the same, in any case/event, in either case/event, any/either way, whichever, anyhow, at any rate, in any case, that may be, and, on the other hand, at the same time, as against that, in fact, as a matter of fact, actually, to tell the truth, in point of fact, instead, rather, on the contrary, at least, rather, I mean.*
Causal	*So, thus, therefore, hence, consequently, because of this, then, in that case, in such an event, under those circumstances, under the circumstances, otherwise, under other circumstances, it follows, for this reason, arising out of this, to this end, for, because, in this respect, because, in this respect, in regard to this, in other respects, apart from this*
Temporal	*Then, next, afterwards, just then, at that moment, previously, before then, first, at first, in the end, finally, at last, eventually, at once, there upon, soon, presently, this time, next time, next day, 2 minutes later, meanwhile, all this time, by this time, up until then, next moment, at this point, here, from now on, henceforth, to sum up, to resume.*

In the next step, the computer software named AntConc 3.4.4w was used to calculate the frequency of the selected list of cohesive conjunctions that was a list of more than 100 conjunctions.

This is the formula used:

Conjunction frequency = (number of different conjunctions / total number of words) * 1000

After that, we conducted a comparative study between the two corpora, considering the frequency of cohesive conjunctions in each corpus.

In this section, the details of the quantitative analysis will be presented. Table 4 provides an overview for the data analysis including the related research questions and steps of data analysis.

Table 4 Research questions and analysis of data

Research question	Objective	Method of analysis	Steps of analysis
Which cohesive conjunctions in the introduced corpus have a higher frequency?	Frequency analysis of 120 cohesive conjunctions in the two corpora	Quantitative	1. Dividing the conjunctions according to Halliday and Hasan's Model to four sub-types; additive, adversative, casual, temporal.
Is there concordance between these two sets of more-frequent cohesive conjunction?	Comparing the frequency of cohesive conjunctions in Iranian articles with that of Non-Iranian articles	Quantitative	2. Analysis of 120 conjunctions in the corpus of Non-Iranian Medical Articles with AntConc. 3. Analysis of 120 conjunctions in the corpus of Iranian Medical Articles with AntConc. 4. Identifying the frequency of each conjunction in the related sub-type group in each corpus. 5. Identification of conjunctions with its specific frequency.
			1. Calculating the total frequency in the four sub-type groups for each corpus and have a comparison between two corpora.
And finally, is there any meaningful difference in using these two sets of cohesive conjunctions in the two sets of articles?	Comparison of differences	Quantitative	Performing a chi-square test on the findings obtained from answering the second research question

After calculating these features, the raw data were analyzed through performing chi-square test to see if the differences between cohesive conjunctions in two corpora were statistically significant or not. Chi-Square Test of Independence with SPSS13.0 software was run for the statistical analysis of cohesive conjunctions. The obtained findings of descriptive and inferential statistics are presented in the following section.

4. DATA ANALYIS AND RESULTS

4.1. Findings based on descriptive data

As it was mentioned before, the selected conjunctions were divided to four groups or sub-types (according to Halliday and Hassan's Model); Additive, adversative, casual, and temporal sub-type. The following tables show the results of calculating the frequency of each conjunction in the related sub-type group in either corpus and the total frequency of that sub-type cohesive conjunction.

4.1.1. Sizes of two corpora

Table 5 shows the descriptive statistics for the two corpora; corpus of Medical Articles written by Iranian writers and corpus of Medical Articles written by Non-Iranian writers.

Table 5 Descriptive statistics of two corpora

Corpus	Number of words	Percentage
Non-Iranian	4505492	73.9
Iranian	1588432	26
Total	6093922	100

As shown in the table, the two corpora are different in their sizes, so in order to make the research more scientific and the results more convincing, and to make the comparison easy, the method of ratio will be used in dealing with the two sets of figures in the following parts of this section.

4.1.2. Analysis of additive conjunctions

The obtained findings of descriptive statistics for additive sub-type are presented here.

Table 6 Descriptive statistics for additive conjunctions in Iranian and Non-Iranian corpora

No.	Additive conjunctions	Frequency	Ratio* 1000	Additive conjunctions	Frequency	Ratio* 1000
1	And	119118	26.44	And	48807	30.73
2	Or	18744	4.16	Or	3879	2.44
3	Also	6455	1.43	Also	2160	1.36
4	Further	1850	.41	Furthermore	404	.25
5	Either	1235	.27	Further	323	.20
6	Furthermore	555	.12	moreover	308	.19
7	Similarly	508	.11	Either	164	.10
8	Moreover	482	.10	Similarly	83	.05
9	Additionally	316	.070	Besides	74	.04
10	Nor	185	.04	Additionally	40	.025
11	Neither	167	.037	Nor	37	.023
12	Alternatively	137	.030	Neither	31	.019
13	Likewise	104	.023	Likewise	15	.009
14	Conversely	90	.019	Conversely	11	.006
15	Besides	57	.012	Alternatively	7	.004
16	Incidentally	10	.002			
17	In addition	6	.001			
18	For example	5	.001			
19	In the same way	2				
20	For instance	1				
21	That is	1				

The most frequent additive conjunctions in Iranian corpus were "and", "or" and "also". "Likewise", "conversely", and "alternatively" were the least frequent ones. In Non-Iranian corpus "and", "or", "also", "further", and "either" had the highest frequency and "for example", "in the same way", "for instance" and "that is" were the least frequent ones. So as table 6 shows "and", "or", and also were the most frequent ones in both corpora.

Table 7 Frequency of additive conjunctions in two corpora

Additives	Iranian	35.44
	Non-Iranian	33.27

4.1.3. Analysis of adversative conjunctions

Table 8 shows the obtained findings of descriptive statistics for adversative sub-type.

Table 8 Descriptive statistics for adversative conjunctions in iranian and non-iranian corpus

No.	Adversative conjunctions	Frequency	Ratio*1000	Adversative conjunctions	Frequency	Ratio*1000
1	However	1130	.71	But	4809	1.06
2	But	1115	.7	Only	3726	.82
3	Only	878	.55	However	3295	.73
4	Though	105	.066	rather	596	.13
5	Rather	99	.062	yet	568	.126
6	Instead	93	.058	Though	353	.078
7	yet	79	.049	Instead	306	.067
8	nevertheless	61	.038	Nevertheless	163	.036
9	Actually	34	.021	On the contrary	125	.027
10	Anyway	3	.001	Whichever	7	.001
11	Anyhow	1	.001			
12	Whichever	1				

The most frequent adversative conjunctions in Iranian corpus were "however", "but", and "only". "Anyway", "anyhow" and "whichever" were the least frequent ones. In Non-Iranian corpus "but", "only", and "however had the highest frequency and "on the contrary", "whichever" and "actually" were the least frequent ones. So as table 8 shows "but", "only", and "however" were the most frequent ones in both corpora.

Table 9 Frequency of adversative conjunctions in two corpora

Adversatives	Non-Iranian	3.07
	Iranian	2.25

4.1.4. Analysis of casual conjunctions

Obtained findings of descriptive statistics for casual sub-type are presents as follows.

Table 10 Descriptive statistics for casual conjunctions in Iranian and Non-Iranian corpus

No.	Casual conjunctions	Frequency	Ratio*1000	Casual conjunctions	Frequency	Ratio*1000
1	Therefore	734	.46	Because	2246	.49
2	Because	673	.42	Thus	1853	.41
3	So	566	.35	therefore	1434	.32
4	Thus	369	.23	So	1011	.22
5	Hence	277	.17	Hence	334	.074
6	consequently	74	.046	otherwise	234	.051
7	Otherwise	62	.039	consequently	145	.032

As table 10 shows "therefore" and "because" were the most frequent casual conjunctions in both corpora and "consequently", "otherwise" and "hence "were among the least frequent ones.

Table 11 Frequency of casual conjunctions in two corpora

Casuals	Non-Iranian	1.71
	Iranian	1.59

4.1.5. Analysis of temporal conjunctions

Tables showing the obtained findings of descriptive statistics for temporal sub-type are presented here.

Table 12 Descriptive statistics for temporal conjunctions in Iranian and Non-Iranian corpus

No.	Conjunctions	Frequency	Ratio*1000	Conjunctions	Frequency	Ratio*1000
1	first	1360	.85	First	2533	.56
2	Then	716	.45	Then	1627	.36
3	Here	279	.17	previously	876	.19
4	finally	250	.157	Here	874	.19
5	Next	179	.11	finally	639	.14
6	previously	131	.082	Next	474	.1
7	eventually	26	.016	eventually	104	.021
8	meanwhile	21	.013	Soon	90	.019
9	soon	15	.009	presently	25	.005
10	afterwards	12		meanwhile	24	.005
11	henceforth	3		hitherto	9	
12	presently	1	.009	afterwards	7	*.004*
13				thereupon	5	
14				henceforth	1	

As table 12 shows "first" and "then" were the most frequent temporal conjunctions in both Iranian and Non-Iranian corpora and "henceforth" and "afterwards" were among the least frequent ones.

Table 13 Frequency of temporal conjunctions in two corpora

Temporals	Non-Iranian	1.59
	Iranian	1.86

4.2. Findings based on inferential statistics

The hypotheses of the research were: 1) There is concordance between the frequencies of cohesive conjunctions in two corpora; medical articles written by Iranians and medical articles written by Non-Iranians and 2) There is meaningful difference in using these two sets of cohesive conjunctions in the sets of articles. Chi-square was performed and as its details come next, the finding confirmed the first hypothesis but rejected the second one; that is "There is concordance between the frequencies of cohesive conjunctions in these two sets of articles", but "There isn't meaningful difference in using these two sets of cohesive conjunctions in the sets of articles."

4.2.1. Chi-Square test of independence for additives

The employed chi-square test is presented in Table 14.

Table 14 Chi-Square test of independence for additives

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.993[a]	27	.575
Likelihood Ratio	34.627	27	.149
Linear-by-Linear Association	.622	1	.430
N of Valid Cases	33		

a. 56 cells (100.0%) have expected count less than 5. The minimum expected count is .48.

Chi-square test did not indicate a significant association between the frequency of additives in Iranian medical articles and frequency of additives in non-Iranian medical articles.

4.2.2. Chi-Square test of independence for adversatives

The employed chi-square test is presented in Table 15.

Table 15 Chi-Square test of independence for adversatives

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.327[a]	18	.434
Likelihood Ratio	25.245	18	.118
Linear-by-Linear Association	.471	1	.493
N of Valid Cases	21		

a. 38 cells (100.0%) have expected count less than 5. The minimum expected count is .48.

The results of Table 15 reveal that there is no meaningful difference in using adversative cohesive conjunctions in two corpora.

4.2 3. Chi-Square test of independence for casuals

The employed chi-square test is presented in Table 16.

Table 16 Chi-Square test of independence for casuals

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.000[a]	13	.374
Likelihood Ratio	19.408	13	.111
Linear-by-Linear Association	.034	1	.854
N of Valid Cases	14		

a. 28 cells (100.0%) have expected count less than 5. The minimum expected count is .50.

The results indicate that there is no meaningful difference in using casual cohesive conjunctions in two corpora.

4.2.4. Chi-Square test of independence for temporals

The employed chi-square test is presented in Table 17.

Table 17 Chi-Square test of independence for temporals

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.000[a]	16	.179
Likelihood Ratio	29.065	16	.024
Linear-by-Linear Association	.187	1	.665
N of Valid Cases	21		

a. 34 cells (100.0%) have expected count less than 5. The minimum expected count is .48.

The results indicated that there is no meaningful difference in using temporal cohesive conjunctions in two corpora.

5. DISCUSSIONS AND CONCLUSIONS

The present study was an attempt to investigate medical articles written by Iranian and non-Iranian authors to get a deeper insight into cohesive conjunctions that are mostly used in medical articles and also make a comparison between these in two corpora.

According to the findings of the frequency analysis, it was found that in Non-Iranian Medical Articles corpus additive sub-type had the higher frequency among the four sub-type groups. The lowest frequency was for temporal sub-type.

Adversatives had the second rank and casuals were the third regarding their frequency. In Iranian Medical Articles the result was almost the same, except the fact that in contrast with Non-Iranian corpus, casuals had the second rank and adversatives were the third regarding their frequency. The findings are in line with Trebits's (2009) and Ketabi's (2012) studies with regard to the most frequent and the least frequent sub-type respectively. Anna Trebits, 2009 investigated conjunctive cohesion in English language EU documents.

In her study like the present research additives were by far the most frequent category of conjunctive cohesion. It's also in line with a study conducted by Hussein Abdelreheim on grammatical cohesive devices. He reported that regarding conjunction sub-types, the results show the extended use of the additive (50%). It's also corresponding to Halliday and Hassan's (1976) view; they are by far the most recurrent of all 'conjunctive relations' (Halliday and Hassan 1976, p. 226).

In another study conducted by Saeed Ketabi and Ali Asghar Jamalvand, 2012 on Conjunction Devices in English International Law Texts and its Farsi Translation like the present study, the least frequent sub category were temporal devices, but the most frequently used devices in the sample texts of the parallel corpus was adversative sub-type.

The results of the performed chi-square test indicated that there was not a statistically significant difference in the use of cohesive conjunctions in two corpora; in line with the result obtained from a study done by Masoud Zoghi and Elnaz Reshadi on lexical ties used in medical science articles written by Iranian and English authors. The results of the study indicated that there was not a statistically significant difference in the use of lexical ties in abstracts, introduction and discussion and conclusion sections of English Medical Sciences articles.

5.1. Discussion of findings for research questions 1, 2, and 3.

The first research question addressed the frequency analysis of cohesive conjunctions in the introduced corpus. According to the findings of the frequency analysis, it was found that in Non-Iranian Medical Articles corpus additive sub-type had the higher frequency among the four sub-type groups. The lowest frequency was for temporal sub-type. Adversatives had the second rank and casuals were the third regarding their frequency. In Iranian Medical Articles the result was almost the same, except the fact that in contrast with Non-Iranian corpus, casuals had the second rank and adversatives were the third regarding their frequency. The prevalence of additives is justifiable regarding the fact that many medical articles are usually descriptive and/or prescriptive in nature.

The second research question asked whether there is concordance between the two sets of high-frequent cohesive conjunction obtained from research question 1.

After analyzing the additive sub-type (including 33 items) in Non-Iranian corpus, through AntConc Software, 21 additive conjunction items were listed. Performing the same analysis for Iranian corpus, a list of 15 additive conjunction items was extracted. In additive sub-type "*that*" in both corpora was the first regarding its frequency, "*and*", "*or*" and "*also*" were on the top of the descending table of frequency in both corpora. *And*, within the additive sub-category, in both corpora, represented a high proportion of the total devices employed, which could be attributed to learners" familiarity in using it. In temporal sub-type that had the lowest frequency in both corpora and included 34 items, 14 conjunction items were listed in Non-Iranian corpus and 12 conjunction items in Iranian corpus. *First* and *then* were on the top of the descending list of frequency in both corpora. This might reflect the learners" awareness of how to begin and introduce further ideas. As it was mentioned before, adversative sub-type was the second more frequent group of conjunctions in Non-Iranian corpus and the third in Iranian. After analyzing the adversative sub-type (including 31 items) in Non-Iranian corpus, 11 adversative conjunction items were listed. Performing the same analysis for Iranian corpus, a list of 12 adversative conjunction items was extracted. In Non-Iranian corpus *but* was the most frequent but in Iranian corpus it was

the second, and the most frequent item was *however*. *Only* in Non-Iranian corpus was the second and in Iranian corpus was the third.

In casual sub-type (the second in Iranian corpus and the third in Non-Iranian) for both corpora a list of 7 items was extracted. *Therefore* was the first item in Iranian but the second in Non-Iranian. In Non-Iranian *because* was the first item.

The third question investigated the existence of any meaningful difference in using these two sets of cohesive conjunctions in the two sets of articles (medical articles written by native authors and medical articles written by non- native authors). For each sub-type of additives one chi-square test was done and in all four chi-square tests, as it was explained in details, Sig was higher than .05, so the assumption of having equal variances was approved. It meant that the result of this test was not significant, and the null hypothesis that there will be no differences was not rejected. So, the results indicated that there is no meaningful difference in using four sub-type cohesive devices in two corpora.

5.2. Limitations of the study

The study presented in this article has confronted two limitations that need to be mentioned. This study did not investigate the malfunction or well-function of conjunctions; so, its investigation is recommended for other researchers working in this matter. One should bear in mind that other factors influencing the cohesion of a text such as mal- function or well-function of conjunctions and also other grammatical devices and lexical cohesive devices were not investigated as part of this research; and as it was mentioned in chapter 2, recently Masoud Zoghi (2013) compared the frequency of the use of lexical ties in English Medical Sciences (EMSs) articles written by Iranian and native writers. An obvious limitation of that study was the size of the corpus (only 20 articles). The present study focused on the use of cohesive conjunctions in medical articles written by native and nonnative authors in a corpus of 800 articles. Researchers can duplicate the present study focusing on other grammatical devices and lexical cohesive devices.

In this study, only conjunctions were selected and studied. Other researchers are recommended to analyze other grammatical cohesive devices to get more comprehensible results. As some previous researches have investigated, a cohesive discourse cannot be conducted by using only grammatical cohesive devices because it is clear that using lexical cohesion has a great role in effective writing. This aspect is neglected from this study, and it may be a good topic for future research.

5.3. Implications

Findings from this study provide valuable insights for the importance of textual cohesion achieved by cohesive conjunctions in academic writ Many ESL and EFL learners are unable to use grammatical cohesive devices (in this case, cohesive conjunctions) in their written production academically and properly enough to create a coherent and cohesive text. By shedding light on the importance of conjunctions as cohesive devices, this study raised awareness for the teaching of cohesive conjunctions that could eventually be applied to English for Academic Purposes courses. Drawing on the corpus-based analysis of cohesive conjunctions used in different frequencies a systematic teaching of these cohesive devices could be designed.

5.4. Suggestions for further research

To get a deeper insight into the use of cohesive devices, it could be useful to conduct the same analysis for other grammatical and also for lexical cohesive devices. In addition, it could be very useful to conduct a deeper textual analysis to investigate the malfunction or well-function of conjunctions; so, its investigation is recommended for other researchers working in this matter.

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