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Original Article

Different English sentence patterns in the Anatomy textbooks – a cross sectional study on simple sentences from selected chapters of Anatomy books

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Abstract

Background: Sentence patterns are formulas to illustrate the design of basic English sentences. It is possible to present different English sentence patterns within Anatomy textbooks in a simplified manner. It will enhance the understanding level of English in the context of Anatomy.

Objective: To identify different English sentence patterns in simple sentences from the Anatomy textbooks for medical undergraduates of Bangladesh.

Materials and methods: The research was descriptive type of cross-sectional which was carried out in the Department of Anatomy, Bangladesh Medical University, Dhaka from March 2022 to February 2023. At first simple sentences were identified among the selected sentences of the recommended Anatomy textbooks for Bangladeshi medical undergraduates. Then different sentence patterns were identified among the simple sentences.

Results: The most frequently occurring sentence pattern was SVC (subject + verb + complement) pattern (21.68%) and SVO (subject+ verb+ object) pattern among eight sentence patterns. Eight sentence patterns three more sentence patterns were also found in the selected chapters from the Anatomy textbook.

Conclusion: There are various sentence patterns in the Anatomy textbooks. It will be easier for medical undergraduates to understand Anatomy easily if different sentence patterns could be identified in the textbooks. This approach may facilitate the medical undergraduates' comprehension of sentence meanings with reduced effort, potentially reshaping their perception of Anatomy as a challenging subject.

Keywords: English sentence pattern, Anatomy textbook, Bangladeshi undergraduates.

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Introduction

Healthcare professionals need to learn a lot of anatomical terms to communicate effectively. The Terminologia Anatomica previously known as Nomina Anatomica, is a valuable resource for anatomists and specialists in medicine and science. The first edition, released in 1998 by the Federative Committee on Anatomical Terminology, gained international recognition. Some experts believe that future editions should have clear definitions and accurate names for clinically and educationally useful parts of the body. This makes updating and expanding the Terminologia Anatomica will be a challenging task for future anatomists[1].

A tendency of using more complex sentence structures in educational materials is common. Anatomical Terminology often consists of single-word and compound structures, many of which come from Latin or Greek[2]. This complexity may affect the sentence patterns in textbooks, as these terms are often used in simple sentences to explain essential concepts. Implications for teaching using simple sentences are vital for helping students develop language skills because they provide the foundation for more advanced structures[3].

Teaching methods should include easier patterns to improve understanding and communication in Anatomy. Balancing simplicity and complexity can better prepare students for advanced anatomical discussions. Sentence patterns can be regarded as the maps of sentences. They are formulas to illustrate the design of basic English sentences[4]. It is necessary to understand sentence patterns by identification of some important parts of speech and sentence parts. English sentence patterns are the frames or molds in which English words must be grasped. It is essential for English teaching and learning to identify the patterns by which the words are put together[5].

The basic sentence pattern consists of a 'subject' and a 'verb' or 'predicate' where a subject means to whom or what something happens and a predicate is what happens[6]. Only a subject or only a verb cannot complete a sentence. To complete a sentence, both a subject and a verb are a must. Some basic sentences also have objects and complements, which are needed to complete the sentence's meaning. In English, words are arranged in patterns to give the correct meaning of the sentence[7].

Simple sentence patterns are basic structures determining the ability to construct compound and complex sentences[8]. The patterns vary considerably writer to writer. Some are used frequently and excessively, whereas others are less in use[9]. A significant volume of English in the Anatomy textbooks may result in difficulty in understanding the subject. The level of understanding of the textbooks affects the attitudes and performances of the learners throughout the course[10].

Medical undergraduates in Bangladesh also face difficulty in dealing with English used in the Anatomy textbook[10]. Suppose the different English sentence patterns in the Anatomy textbooks could be identified and presented in a simplified way. In that case, it might be easier for the students to analyse the sentence's meaning with less effort. They would not try to memorize the information in the Anatomy textbooks, which will fade in the long run. As a result, their perception of Anatomy as a challenging subject would be changed. This study aims to identify different English sentence patterns among simple sentences from the Anatomy textbooks for medical undergraduates in Bangladesh.

Methods

The research was descriptive, cross-sectional in nature, which was carried out in the Department of Anatomy, Bangladesh Medical University, Dhaka from March 2022 to February 2023.

The research was designed to identify different English sentence patterns in the recommended Anatomy textbooks in the undergraduate curriculum of Bangladeshi Medical Colleges. At first three systems: digestive system, locomotor system and nervous system were selected purposively as digestive system mainly deals with the description of various organs, locomotor system deals with the description of bones, joints and muscles and nervous system with the different aspects of nervous system. These three systems were observed under three divisions: gross anatomy, histology and embryology as Anatomy is studied from these three basic aspects. For each division, one textbook of Anatomy was selected from the recommended Anatomy textbooks of gross Anatomy[11], Histology[12], Embryology[13] and Neuroanatomy[14] for medical undergraduates of Bangladesh. Sentences in each textbook were analyzed depending upon the selected topic headings based on previous research works[15-18] , done in the Department of Anatomy, BMU. These topic headings were selected purposively under which a division can be described. From the textbooks, sentences were selected on a topic heading. Each selected simple sentence was analyzed under eight sentence patterns. These eight sentence patterns were selected from a previous study[19].

Eight Sentence pattern used in study

1) SV: Subject + Verb, 2) SVO: Subject + Verb + Object, 3) SVC: Subject + Verb + Complement, 4) SVA: Subject + Verb + Adverbial, 5) SVOC: Subject + Verb + Object + Complement, 6) SVOA: Subject + Verb + Object + Adverbial, 7) SVCA: Subject + Verb + Complement + Adverbial) and 8) SVO1O2: Subject + Verb + Direct object + Indirect object.

Statistical analysis

Statistical analysis was done using Microsoft excel.

Results

Frequency of sentence pattern in four Anatomy textbooks

According to the study, in gross Anatomy and

neuroanatomy textbook the most frequent sentence pattern was SVC. The most frequent sentence pattern in Histology and Embryology was SVOC. No sentence pattern was found from SV pattern. Three new patterns were identified while doing the research. These were SVOCA, SVO1O2C and SVO1O2A. Abbreviation of these new patterns are SVOCA: subject + verb + object + compliment + adverbial, SVO1O2C: subject + verb + direct object + indirect object+ compliment and SVO1O2A: subject + verb + direct object + indirect object+ adverbial.

Table 1 Frequencies of the different English sentence patterns in the four Anatomy textbooks

Sentence pattern	**Frequency* of sentence pattern in Anatomy textbook (n = 736)**			
	Gross Anatomy textbook (n_1 = 288)	**Histology textbook (n_2 = 151)**	**Embryology textbook (n_3 = 119)**	**Neuroanatomy textbook (n_4 = 178)**
SV †	0(0%)	0(0%)	0(0%)	0(0%)
SVO	54 (18.8%)	25 (16.6%)	21 (17.7%)	30 (16.9%)
SVC	**62 (21.5%)**	34 (22.5%)	15 (12.6%)	**48 (27.0%)**
SVA	52 (18.1%)	8 (5.3%)	6 (5.0%)	14 (7.9%)
SVOC	36 (12.5%)	**35 (23.2%)**	**25 (21 .0%)**	31 (17.4%)
SVOA	40 (13.9%)	11 (7.3%)	15 (12.6%)	13 (7.3%)
SVCA	34 (11.8%)	24 (15.9%)	23 (19.3%)	21 (11.8%)
SVO1O2	3 (1.0%)	2 (1.3%)	1 (0.8%)	12 (6.7%)
SVOCA	7 (2.4%)	11 (7.3%)	13 (10.9%)	6 (3.4%)
SVO1O2C	0 (0.0%)	1 (0.7%)	0 (0.0%)	1 (0.6%)
SVO1O 2A	0 (0.0%)	0(0.0%)	0 (0.0%)	2 (1.1%)

Table 2 Some examples of the different English sentence patterns in the four Anatomy textbook

Pattern	Example of sentence	Textbook
SVO	The ileocolic artery supplies the lowest part of the ileum.	(Wineski 2019, p 348)[11]
SVC	Hepatocytes are large cuboidal or polyhedral epithelial cells, with large, round central nuclei and eosinophilic cytoplasm rich in mitochondria.	(Mescher 2018, p 338)[12]
SVA	The duodenum curves around the head of the pancreas.	(Wineski 2019, p 345)[11]
SVOC	Development of the midgut is characterized by rapid elongation of the gut and its mesentery, resulting in formation of the primary intestinal loop.	(Sadler 2019, p 345)[13]
SVOA	The fat causes release of the hormone cholecystokinin from the mucous membrane of the duodenum.	(Wineski 2019, p 371)[11]
SVCA	Cartilage cells and matrix may shrink slightly during routine histologic preparation, resulting in both the irregular shape of the chondrocytes and their retraction from the matrix.	(Mescher 2018, p 132)[12]
SVO1O2	The superior colliculus is connected to the nuclei of the extraocular muscles by the reticular formation.	(Splittgerber 2019, p 284)[14]
SVOCA	Most defects of the spinal cord result from abnormal closure of the neural folds in the third and fourth weeks of development.	(Sadler 2019, p 322)[13]
SVO1O2C	Excessive brain movement or other cranial trauma can put significant traction on the cranial vessels, leading to rupture and hemorrhage.	(Splittgerber 2019, p 429)[14]
ASVO1O2	On entering the pons, the tract is broken into many bundles by the transverse pontocerebellar fiber.	(Splittgerber 2019, p 154)[14]

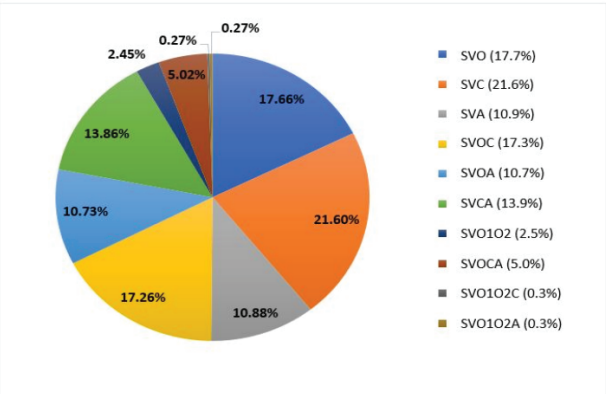

Fig 1 Total frequency of different sentence pattern

Among eight sentence patterns, identified in the selected sentences of the textbooks, the most frequently occurring sentence pattern (Figure 1) was SVC pattern (21.6%), followed by SVO pattern (17.7%) and SVOC pattern (17.3%). The least frequent patterns were SVO1O2C (0.3%) and SVO1O2A (0.3%). No sentence of the SV sentence pattern was found.

Discussion

Anatomy terminology is important for physicians and medical students. There are special words used to describe different parts of the body. The first phase medical undergraduates of Bangladesh sometimes found this subject very difficult to learnt[20]. It can be hard to learn all the new words with different English patterns, so easier ways should be searched to teach them.

In the current study, the researcher tried to find out the frequency of different sentence patterns in the Anatomy textbooks. A total of 736 simple sentences were analyzed by the researcher based on eight sentence patterns. But out of these patterns, three more patterns (SVOCA: Subject+ Verb+ Object+ Complement+ Adverbial, SVO1O2C: Subject+ Verb+ Direct object+ Indirect object+ Complement and SVO1O2A: Subject+ Verb+ Direct object+ Indirect object+ Adverbial) were also found during the analysis of the sentences (Table 1).
Total 288 sentences were analyzed in gross Anatomy where most frequently occurring pattern is SVC (21.5%). In gross Anatomy a subject might be a muscle or viscus or organ or bone etc. That means gross Anatomy mainly deals with the description of a structure. The second and third most common frequent pattern in gross Anatomy are SVO (18.8%) and SVA (18.1%). This indicates there are many sentences in gross Anatomy those deal with the action of the structure/organ/muscle/viscus etc. and location or site of action or condition of that. From histology textbook total 151 sentences were analyzed where most frequently occurring pattern were SVOC (23.2%) and SVC (22.5%). In Histology the subject is any microscopic structure These indicate most of the sentences are related to the description of a subject or related to the description of the object that receive the action of a verb.

A study analyzed 40 anatomy articles from English Wikipedia to evaluate their quality and readability. The examination included both quantitative and qualitative assessments. Quantitative assessment involved analyzing the edit history of each article, counting references and media, and evaluating article readability. On average, each article was updated 8.3 times per month, referenced with 33.5 sources, and contained 14.0 media items. The articles were found to have low readability, making them more suitable for college-level readers and above. Qualitative evaluation involved experts assessing the articles using a modified DISCERN survey. This evaluation revealed that 32.5% of the articles were rated as "good", 60% as "moderate", and 7.5% as "poor". Positive correlations were observed between the DISCERN score and the number of edits, number of editors, and article length. Strengths such as completeness, anatomical details, and clinical information were identified, as well as areas for improvement, such as providing missing information and addressing inaccuracies. The study also found that many Wikipedia anatomy articles were challenging to read and that the quality of each article was influenced by its edit frequency and length. The findings suggested that caution should be exercised when using Wikipedia articles for anatomy education due to these limitations[21].

The current study explored and analysed 119 sentences from Embryology most commonly occurring sentence patterns. There were SVOC (21%) and SVCA (19%) patterns. As Embryology mainly deals with the process of development which require the description of time, place and manner so that in Embryology adverbial has is necessary. In Neuroanatomy textbook 178 sentences were analyzed where most frequently occurring patterns were SVC and SVOC. These indicate most of the sentences are related to the description of a subject or related to the description of the object that receive the action of a verb. In both of these patterns, the compliment describes or explains or gives more information regarding the subject or object. Scientists have used various imaging techniques to study how the brain processes English words. While there is agreement on the brain areas involved in understanding words, there are still disagreements about the specific processes in these areas. Analyzing the timing and connections among these brain areas can help us understand their processes. In a different study, tasks related to understanding the meaning of individual words or their relevance within a sentence were focused. Their findings confirmed previous research suggesting that areas in the front of the brain associated with meaning become active before areas in the back. By manipulating participants' attention, they aimed to enhance specific brain areas involved in understanding word meanings or determining the

relationship of a word to a sentence. This was to test the idea that frontal brain areas are responsible for processing word meanings, while posterior areas are more engaged in understanding sentences involving multiple words[22].

A recent study revealed that sentence patterns of the peripheral nervous system was considered the most complex because of its intricate structure-function connections and visualization challenges. On the other hand, the cardiovascular and skeletal systems are seen as the easiest to understand due to previous exposure and simpler visualization[23].

The SVO pattern mostly contains a direct object. For example (as given in table-2) the ileocolic artery supplies the lowest part of the ileum, in this sentence the verb 'supply' has the object 'lowest part of the ileum' to find out the object if we ask a question, which structure is supplied by the ileocolic artery? Then the answer will be the lowest part of the ileum. Initially a medical undergraduate will try to memorize this fact, but when he or she will memorize many facts it might be difficult to remember many things without understanding. On the other hand, if he/she tries to understand the component of sentence pattern, the subject, object and verb it might be easier for him/her to remember a fact.

In SVC pattern, the complement refers to the description of the subject or object. For example, in the sentence (selected from histology textbook), 'hepatocytes are large cuboidal or polyhedral epithelial cells, with large, round central nuclei and eosinophilic cytoplasm rich in mitochondria', there are many information regarding the description of hepatocyte. It might be difficult to remember the information in the long run if a medical undergraduate only memorizes the sentence without understanding it. But if he/she tries to understand that the description is related to the shape and structure of the cell hepatocyte, it will help one to understand the long sentence as well as to retain the knowledge for long time.

In SVA pattern, adverbial specify place, time and manner. The duodenum curves around the head of the pancreas, in this sentence 'around the head of the pancreas' is the adverbial as it is the place related to the verb 'curves'.

Among 716 sentences the most frequently occurring sentence pattern (Figure 1) SVC pattern (21.6%) reflects the basic theme of Anatomy that it firstly introduces the description of a structure, organ, viscus etc followed by the description of the action of that which is reflected in 2nd highest pattern SVO pattern (17.7%).

In the present research total eight patterns were selected while Adeeb and Nouri (2013) selected six patterns. In the present research, the most frequently occurring sentence pattern was SVC (21.68%) which does not correspond with Adeeb and Nouri's (2013) finding where the most frequently occurring sentence pattern was SVO[24]. In both researches, the least frequently occurring sentence pattern was SVO1O2.

Limitations

The number of selected simple sentence might affect the percentage of sentence patterns found in four Anatomy textbooks. Sentences were not analyzed with the help of any English expert. Only quantitative analysis was conducted.

Conclusion

Anatomical terminology is complex, making it difficult for first-year medical students and newcomers to the field to learn and understand. This highlighted the need to simplify anatomical language. This article will explore strategies to help medical students learn human gross anatomy and its terminology more effectively.

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Author contribution

• Conception and design: TR1, NFA2
• Acquisition, analysis and interpretation of data: TR1, NFA2, NH3
• Manuscript drafting and revising it critically: TR1, NFA2, AN4, YS5
• Approval of the final version of the manuscript: TR1, NFA2, NH3, AN4, YS5
• Guarantor accuracy and integrity of the work: TR1, NFA2, NH3, AN4, YS5

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Conflict Of Interest

None.

Ethical Approval

The research was approved by institutional review board (IRB), BMU (BMU/2022/6457, date: 28/6/22).

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