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IRAVAN TEACHERS' SEMINARY

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ABSTRACT

The article is based on the establishment of the Yerevan Teachers' Seminary and its history. It is informed that the school established in October 1880 in the city of Yerevan.
The main aim in the article is explore establishment history of the school and its achtivity. This educational institution, which operated for a total of 37 years, was closed on August 6, 1918 at the same time as Yerevan gymnasium and Uluhanli school. Yerevan Teachers' Seminary played an important role in the development of the educational environment in Azerbaijan, fulfilling its historical mission and creating a separate stage.
So, on 14 January, 1832, Azerbaijani children began to study together with children of different nationalities in the first emergency school opened in Yerevan. Additionally, the Yerevan emergency school opened in 1832 became a gymnasium in 1869 and a 5-class gymnasium on 31 March, 1881.
Due to the original regulations of the teachers' seminary, Orthodox boys over the age of 16 could be admitted to the such educational institutions. In 1875, the Instruction on the Teaching Clergy allowed Muslims to study in theological schools alongside the Orthodox. On 20 October of 1880, the Russian State Council adopted the decision "On the organization of teachers' seminars in Kutaisi and Yerevan governorates." According to this decision, 28,350 rubles were allocated from the state treasury to Yerevan Seminary. Yerevan Teachers' Seminary started working on 8 November, 1881 in the current building of the Yerevan National Economic Institute with 42 students and 9 teachers. The first director of the seminary school was an educator Jacob Stepanovich Sushevsky.
The study of the history of the Teachers' School founded 141 years ago. Conferences, round tables and a series of events will continue in this regard. The legacy of this great source of information, which made great contributions to the development of our national education and opened bright pages in our educational history, will continue to shine hundreds of years later.
Result: The Yerevan Teachers' Seminary, which has been operating for 37 years, has played an important role in the development of the educational environment in Azerbaijan, including fulfilling its historical mission and creating a new stage.
Application importance: this material can be used in HEIs and can be useful for historians and to whom interested in history.
Keywords: teacher, seminary, Yerevan, education, Azerbaijan

History of Yerevan Teachers' Seminary

Until the 70s of the 19th century, there was no school teaching secular subjects in the entire Caucasus, or any educational institution training pedagogical personnel to teach these subjects. As in Azerbaijan, until the opening of secular schools, only mollakhanas and madrasahs functioned as educational institutions, apart from mosques. Madrasahs and mollakhanas, which have been

operating for centuries, have not been able to ensure the cultural progress of our people and have slowed down the development process. Thus, the political processes in the South Caucasus at the beginning of the 19th century caused new trends in school and education, as in all fields. Madrasahs and mollakhanas, which are now functioning as educational institutions, have gradually shrunk and had to be replaced by secular schools [2].

After the South Caucasus was occupied by Russia, including the Azerbaijani khanates, every sphere of life began to come under Russian control. In 1829, at the beginning of August, the Ministry of Education of Russia adopted the decision "On the state of Transcaucasia schools". The establishment of emergency schools and the management of the general education system were reflected here. In the 70s of the 19th century, in these schools, which were opened in various areas of the South Caucasus, educational institutions that taught children the basics of science in a new way began to be seriously organized. Dozens of progressive Azerbaijani intellectuals joined this enlightenment movement, which started in the South Caucasus, and started fighting for the participation of young people in education.

Thus, on January 14, 1832, Azerbaijani children began to study together with children of different nationalities in the first emergency school opened in Yerevan. In addition, the Yerevan emergency school opened in 1832 became a gymnasium in 1869, and a 5-class gymnasium on March 31, 1881. On November 8, 1881, the Yerevan Teachers' Seminary, an educational institution, was opened in Yerevan. Apart from representatives of many nationalities, Azerbaijanis also studied here. It can be noted that the establishment of the Iravan Teacher's School and Gymnasium had an important impact on the spread of enlightenment in the South Caucasus. Tatar language (Azerbaijani language) was taught in the seminar by Akhund Mammad Bagir Ghazizade. He was born in Yerevan in 1853 and graduated from Yerevan gymnasium. Having high knowledge, Ahund Mammad Bagir also headed the Azerbaijani branch of Ghazizade theological school. In 1911, he was one of the authors of the "Mother Language" textbook published in Tbilisi with a group of colleagues working at the Yerevan Teachers' Seminary. According to the conducted research, Akhund Mammad Bagir Ghazizadeh, who is the head of the Azerbaijan branch of the theological school, played a great role in conducting Sharia classes at a high level, improving the teaching conditions and engaging our young people more.

The creation of a new school system in the territory of Yerevan coincided with the 1930s. The first charter of Transcaucasia schools was adopted in order to keep the local population obedient, to implement Christianization and Russification policies, and to strengthen the tsarist administration. According to this charter, 20 emergency schools were to be opened in the South Caucasus. In 1832, the first secular school, a two-room emergency school, was established in Yerevan. In 1839, the emergency school was transformed into a three-class emergency school, and in 1869 into a four-class progymnasium, and in 1881 into a gymnasium. About 600 Azerbaijanis graduated from the gymnasium. A major part of the pedagogical activities of Firidun Bey Kocharli, a prominent Azerbaijani educator, was related to the gymnasium. The emergence of new-style mother tongue schools in the city of Yerevan also coincides with this period. In 1882, Mashadi Molla Ismayil Haji Kazimov from Tabriz, as well as Mirza Hasan Rushdiya and Mirza Kazim Ashkarzade came to Yerevan in 1883 and opened new method schools [4]. Over the years, the opening of emergency and primary village schools in Iravan governorate created a necessary need for public teachers. At that time, state teachers for primary schools were trained in theological schools and teachers' institutes.

According to the original regulations of the teachers' seminary, Orthodox boys over the age of 16 could be admitted to such educational institutions. In 1875, the Instruction on the Teaching Clergy allowed Muslims to study in theological schools alongside the Orthodox. On October 20, 1880, the Russian State Council adopted the decision "On the organization of teachers' seminars in Kutaisi and Yerevan governorates." According to this decision, 28,350 rubles were allocated from the state treasury to Yerevan Seminary. Yerevan Teachers' Seminary started working on November 8, 1881 in the current building of the Yerevan National Economic Institute with 42 students and 9 teachers. The first director of the seminary school was Jacob Stepanovich Sushevsky, an educator. Here, education was managed by the primary school under the preparatory class for 3 years. Pupils spent their pedagogical experience in this school. The dormitory operated. Along with Azerbaijanis, children of Armenian, Russian, Georgian and other nationalities were educated here. The charter of this institution is the same as the Gori Teachers' Seminar. Like other seminaries, Yerevan Teacher's Seminary consisted of 4 classrooms. Preparatory group and first-year student admissions were announced every year. Students were not allowed to enroll in classes II and III directly. Those admitted to the first course had to take exams in Russian language, theology, geometry, arithmetic, history, geography, and biology. In the 1883/1884 academic years, the number of weekly lessons in the preparatory group is 36 hours, in the first year 38 hours, in the second year 39 hours, and in the fourth year 40 hours. In the following years, the number of students and teachers increased. According to information up to December 1882, 54 students studied there [1].

In the academic years of 1882-1883, 61 students, 13 of whom were Azerbaijanis, studied in the primary school within the madrasa. In 1889-1900, the number of students reached 82 people. The director of the model school was V. A. Mukhin, A. Suvorov and the first Azerbaijani teacher Mashadi Bagir Kasimzade at different times. Azerbaijani children in lower preparatory classes: 5 hours on Russian language, 5 hours on mathematics, 4 hours on theology, 2 hours on history, 2 hours on geography, 2 hours on physics, 2 hours on natural sciences, 2 hours on song, 2 hours of poetry lessons, 2 hours of painting, 2 hours of calligraphy lessons, total 30 hours per week. Azerbaijani children can work with Christian children after learning the Russian language, history, geography and Russian traditions. Children who did not speak Russian were taken to the lower preparatory class. It was not mandatory for Azerbaijani students to be admitted to lower preparatory classes and to study at the seminary for 5 years. When completing the lessons, the preparation levels of the students were taken into account. Students who knew Russian and had a certain level of preparation were admitted to secondary school or first grade. The seminars lasted 4 hours in the 2nd grade, and 8 hours in the 3rd grade in the elementary school.

Akhund Mammadbagir Gazizade was the first Azerbaijani teacher who taught at the Yerevan Teachers' Seminary, an outstanding scientist, pedagogue. Since the opening of the seminary, he taught theology and the Azerbaijani language, and in the years 1897-1917, he taught only theology. Since 1892, Mirza Rahim Khalilov taught Azerbaijani language at the theology school. Khalilov graduated from this theological school in 1881 and was hired for this position on the advice of his teacher Akhund Mammadbagir Gazizade. Educator Akhund Mammadbagir Gazizade had important services in the preparation of those teachers for Azerbaijani schools in the theological school. He spent all his knowledge and skills on training teachers. At various times in Azerbaijan, they gave seminars to Mammadbagir Gazizade, Mirza Mammadvali Gamarli, Akhund Mammadbagir Kazimzade, Rashid bey Shahtakhtinsky, Jafar bey Jafarbeyov, Hamid bey

Shahtakhtinsky, Ahund Mammadbagir Taghizadeh, Mammad Akhundov, Mirza Jabbar Muhammad [8].

As in other seminaries, tuition in this seminary was paid. A certain part of the students studied at the expense of the state. Those admitted paid 210 manats in the first academic year, and 180 manats in the following years. According to the information of 1907, only 20 of the 70 students studying here were educated at their own expense. According to the information given in the 1913 issue of the "Caucasian Calendar", only 46 of the 128 students studying at the theological faculty are Russian, 30 are Azerbaijani, 37 are Armenian, 6 are Georgian, and 9 are representatives of other nationalities.

The development of the Yerevan Teachers Seminary

The first graduation of the Yerevan Teachers Seminar in history dates back to 1884. 5 Azerbaijanis graduated from the seminary that year. The tenth edition of the seminar took place in 1893, the twentieth in 1903, and the thirtieth in 1913. At the end of the 19th century, many provincial school teachers and principals working in the territory of the South Caucasus obtained the right to teach in that theological school by taking an external exam in different years. By the decision of the Faculty of Theology Pedagogical Council, in 1895, Mammad bey Gaziyev, Jalil Mirzayev, Taghi bey Safiyev, and in 1902, Jabbar Mammadov, Ibadullah bey Mughanlinski, Shamdan Mahmudbeyov and others were given the title of village teacher. The initiator and organizer of this noble work was former educator Akhund Mammadbagir Gazizade. Graduates were required to work in rural schools by appointment. It is clear from the document issued to Mehdi Kazymov, who graduated from the Faculty of Theology in 1910, that he had to work for 6 years, otherwise he had to pay 520 rubles to the treasury.

Ahmed bey Gaziyev, Ali Eshref Gaziyev, Hasan bey Akhund Molla, son of Khalil bey Gaziyev, Faramez Mahmudbeyov, Yusif bey Gaziyev (Gazizade), Mahmudbeyov son of Mammad bey Ali bey, Hasan Nasirbeyov, Khalil Mammadaliyev, Caferbey Caferbeyov, Saleh Meshadi Teymur, his son Aga Bey Firudinbeyov, Abbas Gadimov, Ali Sultanov, Abbas Allahverdi oglu Gadimov, Mir Hashim Bey Vazirov, Farrukh Agakisibeyov, Ali Jalilzade, Shikhali Bey Firudinbeyov, Mirza Bagir Aliyev, Ibrahim Shahtakhtli, Jabbar Mahammadzade, Vahid Musabey Bey, Rahid Musabey Bey Shafibeyov, Najaf Bey. Vazirov, Ibadulla bey Mughanlinski, Hashim bey Vazirov, Mirza Abbas Mahammadzade, Huseynali bey Rustambayov, Vahid Musabeyov, Hashim bey Narimanbey, Sahmil bey Narimanbey, Taghi bey Safiyev, and others, Sahmil bey Naribey and others were distinguished. Ibrahim Safi, one of the famous artists of Turkey, also graduated from the same theological school.

The seminar was chaired at different times by Ivan Andreyevich Pasyutevich, Jacob Stepanovich Sushevsky, Valentin Vasilyevich Dubromin and Mikhail Alekseyevich Miropiev [7].

Yerevan Teachers' Seminary has become not only an educational institution, but also a center of science and culture of the city. In 1881-1914, 63 Azerbaijanis graduated from Iravan Teachers' Seminary.

In 1915, the Yerevan Teacher's Seminary was transferred to Sardaraba (now Armavir) and this seminary operated there until 1918. At that time, B.B. Dobromin was in charge of the seminar. 3 theology teachers, 9 branch teachers and 1 doctor served in the seminar. Mirza Jabbar Mammadov taught the Azerbaijani language, and Akhund Mammadbagir Ghazizade taught Sharia. In 1918, the Madrasah ceased its activity as a result of the ethnic cleansing carried out by the Armenians against the Azeris, some teachers and students were brutally murdered, and the survivors left their

homes and took refuge in Azerbaijan and Turkey. The first Armenian state (Ararat) was established on the basis of the Iravan governorate, which was established with the direct support of Tsarist Russia as a result of the assistance of the Russian Soviet Federative Socialist Republic in the territory of the former Azerbaijan. Azeris, the former inhabitants of these lands, became one of the few peoples in their homeland. In 1924, thanks to the national will and insistence of Bala Efendiyev, the head of the minority department of the Central Committee of the Communist Party of Armenia, Mehdi Kazimov, the head of the "Minorities" bureau of the People's Education Commissariat, Huseynov, the editor-in-chief of Mustafa Zangi newspaper and other intellectuals, the Yerevan Teachers' Seminary successor Iravan Turkish Pedagogical College was opened on October 15. The goal was to prepare primary school teachers for the schools where Azerbaijanis study. However, the environment of the Turkish Pedagogy Technikum District, where the traditions of the Yerevan Teachers' Seminary played an important role in the formation and development of the eternal cultural and educational society, faced great difficulties from the very beginning. Due to mass deportation of Azerbaijanis from the current territory of Armenia, he moved to Khan region. The ground was prepared for mass deportation [5].

Research shows that Jalil Mammadguluzade visited Yerevan in June 1906, met prominent Azeri intellectuals, teachers and students at the theological school, and exchanged wide views about the "Molla Nasreddin" magazine. The teachers and students of the Azerbaijani branch of the Yerevan Teachers' Seminary had a great role in the creation of the "Molla Nasreddin" magazine in Yerevan. "Zanbur", "Iqdam", "Tuti", "Babayi-Amir", "Translator", "Mazali", "Irshad", "Shalala", "Suvaqat", "Kaspi", "Kaskül" etc. Azerbaijani students and intellectuals played an important role in its spread in Yerevan.

It is possible to note that in 1904, the Yerevan Teachers Seminary Rashid bey Shahtakhtinski, and in 1907, and Hamid bey Shahtakhtinski teached the Azerbaijani language (Tatar). After graduating from the Yerevan Teachers Seminary in June 1899, Hamid bey, the Iranian Russian-Tatar school was appointed by Azerbaijani language at the Yerevan Russian-Tatar school in early September 1899. On October 27, 1901, the director of the Caucasus Enlightenment department 14622 is appointed Tatar language (Azerbaijani language) teacher at the Yerevan Teacher Seminary. At the end of the decision of Hamid Bey Caucascaz Education Department of Hamid Bey Caucascaz in the late October 19273, Tatar language teacher teacher is fired in the Yerevan Teacher Seminary.

Mirza Jabbar Mammadzade was appointed as an Azerbaijani language (Tatar language) teacher after Hamid bey'w release from the teaching seminary in 1907 in the Yerevan Teacher Seminary on January 19, 1913 students from Baku, Nakhchivan, Dagestan and other cities studied in the seminary. Graduators were given a certificate on teacher of village primary school.

Ali Ashref Gaziyev, Ahmad bey Gaziyev, Hasan bey Akhund Molla, Yusif Bey Akhund, Khalil Mahmudbeyov, Hasan Nasirbayov, Saleh Mahmadaliyev, Hasan Nasirbayov, Mir Hashim Bey Vazirov, Abbas Allahverdi Gadirov, Farrukh Aghakishibeyov, Ali Sultanov, Mirza Baghir Aliyev, Ali Jalilzadeh, Jafarbeyov, Ibrahim Shahtakrakhti and others have graduated from the seminar of Yerevan. Until 1910, 30 Azerbaijani teachers graduated from school. The total number of Azerbaijanis studying in 1915 was 22 [4].

Educational system of Yerevan Teachers' Seminary

In the seminar, Azerbaijani language, Russian language, geography, sports, mathematics, etc. music was also taught. In 1885, a total of 69 people, including Azerbaijanis, received music education under the guidance of N. Kasradze, who worked as a music teacher in the madrasa.

Graduates of the Yerevan Teachers' Seminary played a major role in the development of national education in the South Caucasus. They actively participated in the opening of new schools in the regions where Azerbaijanis live, including the participation of Azerbaijani children in education. These supporters of education made great sacrifices for this national renaissance mostly in Yerevan, Nakhchivan and different regions of Azerbaijan. Ibadullah Bey Mughanlinski, Mammad Akhundov, Jafar Karimov, Mammad Vali Gamarlinski and others spent not only their efforts and skills, but also their lives and financial resources for the cultural progress of our people in Yerevan. Jafarbay Jafarbayov was also in Yerevan III. He managed to open a private school and managed the hostel he opened. In 1897, Caferbey graduated from the preparatory class of the Yerevan gymnasium, and in 1901 he graduated from the Yerevan Teachers' Seminary. Asghar Akhundov, who graduated from the Yerevan Teacher Training School in 1911, manages to open a third-grade 1-class boarding school here. In 1903-1917, Shamdin Bey Mahmudbeyov, who graduated from the Faculty of Theology, studied at Uluhanli village school, Shikhali Bey Firudinbeyov at Gamarli village school, Yusif Babayev at Dvin-Aysor village school, Mirza Jabbar Mammadov at Goymeshchidullah village school and Ikhanski village school. In 1903-1917, he was the head of the village school of Derachichek.

Ilya bey Mahmudbeyov, Ahmed Hashimov in Chobankara village, Jalil Mammad oglu Mirzayev, Shikhali bey Firudinbeyov, Hasanbey Akhund Molla Khalil bey oglu Gaziyev, Mirza Muhammad Akhundov in Gamarli, Mammad bey, Mammad bey in Yerevan, Akhund Mammad Bagir in Gazizade, Big Ved in Lut, Jafar Karimov Sharurda and Faramez bey Mahmudbeyov taught. These teachers working in Yerevan and the regions have done very important work for the sake of national progress. In addition, Taghi bey Safiyev, who graduated from Yerevan Teachers' Seminary in 1895, also worked as a teacher in Nehram village of Nakhchivan for a long time. During this period, his booklet "Nehram Village" was published. Hasan Safarli was one of the graduates of Yerevan Teachers' Seminary. Hasan Safarli, a good Russian language and mathematics expert, also taught at the "Rushdiya" school operating in Nakhchivan from 1917 to the middle of 1919. In 1919, H. Safarli worked as the director of an orphanage in Nakhchivan. In 1965, he received the honorary title of "Honored Teacher".

Huseynalibey Rustambayev, an alumni of the Faculty of Theology, did great educational work in Lahij and Jalil Babayev at the Basgal village school of Ismayilli district of Azerbaijan. It can be noted that the author of the one-act play "Unwilling Marriage" staged in Yerevan on April 4, 1890, was Abbas Rizayev, a student of the Yerevan Seminary. As a result of research, it was found that 63 Azerbaijanis graduated from Iravan Teachers' Seminary in 1881-1914, and 22 in 1915.

Hasan Bey Gaziyev was one of the leading graduates of the Yerevan Teachers' Seminary. He was born in 1879 in Yerevan. After graduating from the Yerevan Teachers' Seminary in 1896, he taught Russian at the Uluhanli school, and until 1918 he taught Russian at various national schools in Yerevan. Hasan Bey was also a member of the religious community of Muslims in Iravan province. He settled in Nakhchivan during the massacres of Armenian bandits in 1918 and taught Russian in various schools. Our respected teacher Hasan Bey Gaziyev dedicated a large

part of his life to the development of our national education. He was buried in Nakhchivan in 1950 [8].

Ali Azim Ibrahimov occupies an important place among the graduates of the Yerevan Teachers' Seminary. He was born in Agdam in 1894 and worked here for a long time in the field of public education. After graduating from theological school in 1914, A. Ibrahimov joined the revolutionary movement and became one of its activists. In 1914-1916, he worked as a teacher in the village of Big Vedi. At the beginning of 1916, he settled in Aghdam province and taught Russian there.

İbrahim Safi, one of the famous artists of Turkey, also graduated from the Yerevan Teachers' Seminary. After the Second World War, he settled in Turkey and lived there until the end of his life. In general, the graduates of the Azerbaijan section of the Yerevan Teacher's Seminary and Gymnasium in the "Red Tabor" created by Abbasgulu bey Shadlinski made great contributions to the education of the people of West Azerbaijan and the fight against Armenian chauvinists. It is also known from the research that most of those who were oppressed in 1937 were graduates of Yerevan Teacher's Seminary and Yerevan Gymnasium, as well as secular schools there.

During the mass massacres of Armenians against Azerbaijanis in 1918, the centers of education and culture, which paved the way for the national renaissance mentioned above, ceased their activities. Some of the Azerbaijani teachers, students and intellectuals working in these cultural and educational institutions were brutally murdered during these events, and some had to leave history and their homeland to avoid being brutally murdered.

At the end of November 1920, with the establishment of the Soviet power in Armenia, the attitude to the problem of school and education changed in this area as well as in other republics. On December 6, 1920, the Armenian Revolutionary Committee signed a decree on the transfer of all schools to the state and education in the mother tongue. In the middle of December 1921, by the order of the Armenian People's Commissariat of Education, old-style schools were canceled and new-style Soviet schools were started to be organized. According to the decree of ExMK dated April 23, 1921 regarding the organization of new type of schools, it was stated that Azerbaijanis living in the republic could study in their mother tongue.

Thus, one-year, two-year and private schools were abolished, the first steps were taken towards the organization of Azerbaijani schools in a new context. New type of schools were organized and started to operate. After the establishment of new-type schools, the expansion of the network of educational centers in our mother tongue in Yerevan and in all regions inhabited by Azerbaijanis led to a rapid increase in the number of students studying there [6].

Influence of the Yerevan Teachers' Seminary to Azerbaijani schools

One of the main reasons for the rapid increase in the number of Azerbaijani students is the part of our compatriots who left their homeland in 1918 to escape the cruelest killing methods as a result of the persecution of Armenian bandits. After the establishment of Soviet governer in Armenia in 1920, they returned to their homeland.

The expansion and management of the network of educational centers in our national language and the rapid increase in the number of students studying there have increased the need for pedagogical staff.

At the first congress of EK(b)P held on January 30, 1922, the idea of creating an educational center that prepares teaching staff for national schools was brought up by Azerbaijani intellectuals, but their demands were not taken into account.

However, the issue of solving the problem of teacher shortage in Azerbaijani schools remains on the agenda. At the Second Congress of the CP of Armenia held at the end of March 1923, the issue of training of teaching staff for Azerbaijani schools was brought up again, but it has not yet been resolved. At the congress, the commissioner of public education of Armenia and chauvinist circles A. Mravyan considered it more appropriate to invite academic staff from Azerbaijan in order to provide teaching staff to schools in the country. Chauvinist circles of Armenia used various means to prevent the preparation of local personnel for schools in Azerbaijan. Here, the most heinous goals of the Armenian bandits, who entered the Bolshevik veil, were to hinder the education, cultural development and future prospects of Azerbaijanis at any cost. In the middle of 1923, in order to provide Azerbaijani schools with pedagogical personnel, lecturers of various specialties were invited from Azerbaijan and sent to Yerevan and the regions where Azerbaijanis live to perform pedagogical activities. The real Armenian character created unbearable conditions for teachers teaching in schools in Azerbaijan, so they had to leave Armenia because they could not bear the financial and moral difficulties [3].

Summer training course for two months was held in Yerevan in November 1923 as a result of the efforts of Mehdi Kazimov, the head of the Department of Minorities established under the Ministry of Education and Culture in 1922. The need for teaching staff in Azerbaijani schools. More than 60 teachers were trained in Azerbaijani schools in this preparatory course. In addition, preparatory courses were held in Uluhanlı, Vedi, Basharkechar, Zangezur, Agbaba and various regions where Azerbaijanis live. Many pedagogues have gained qualifications by studying in such courses. These preparatory courses, held at the end of 1923, prepared 143 teachers, 6 of whom were women, by 1926. Bala Efendiyev, Mehdi Kazimov, Mustafa Huseynov and others, prominent representatives of Azerbaijan's socio-political, literary and cultural environment in Yerevan, played a role in organizing these courses.

Based on the approval of the Azerbaijan People's Commissariat of Education, 16 people from Iravan were sent to Baku in 1923, and 38 people were sent to many higher educational institutions for pedagogical training in order to partially eliminate the problem of teacher shortage. After graduating from the Azerbaijan Higher Pedagogical Institute, our young people like Tajira Bagirova and Zahra Abbasova returned to Yerevan and contributed to the development of education.

Despite all this, these measures could not meet the needs of teaching staff. In addition, the chauvinist circles of Armenia did not want to open an independent educational institution training teachers for the schools of Azerbaijan in the territory, they wanted to open an Azerbaijani department under the Armenian Pedagogical Technical College. Bala Efendiyev, head of the Minorities Department of the EC(b)PMK, Mehdi Kazimov, head of the "Minorities" office of the EC(b)PMK, Mustafa Huseynov, the editor-in-chief of the "Zengi" newspaper, and other zealous Azerbaijani intellectuals insisted, with serious efforts, political and national the will. The Yerevan Turkish Pedagogical Technical College, considered the successor of the Yerevan Teacher's School, was opened on October 15, 1924 in front of Armenian chauvinist circles [4].

Thus, with the opening of the Iravan Turkish Pedagogical Technical College, the first step was taken in the field of organization of work in the direction of satisfying the need for pedagogical personnel in the schools of Azerbaijan. If we look at the first period of activity of the technical school, Mehdi Kazimov's Russian language teacher and director, Bala Efendiyev's community teacher, Asgar Asgarzade's mother tongue teacher, Jamil Aliyev's nature teacher, and Karim Maharramov work as technical assistant.

In 1925, this educational institution was named Iravan Turkish Pedagogical Technical College after Nariman Narimanov.

The research shows that the problems in all Azerbaijani schools in Yerevan are also present in this technical school. This educational institution, which operated in the building of the Armenian Pedagogical Technical College, consisted of a narrow classroom and two bedrooms for 30 students. It is known that in order for any educational institution to function harmoniously and normally, it must provide an independent structure, create a material and technical base, and have favorable conditions for the educational process. The newly created Iravan Turkish Pedagogical Technical College works in completely unbearable and unfavorable conditions, textbooks and teaching aids, lecture cabins, laboratories, educational programs, dormitory, canteen, etc. The lack of equipment definitely hindered the normal functioning of this educational institution.

The Armenian authorities, dressed in the "Bolshevik" skin, did not make any effort to eliminate the problems and shortcomings that existed not only in the technical school, but also in Azerbaijani schools. The discriminatory and biased policy of the Armenian chauvinists against the Azerbaijanis in every field has also manifested itself in the field of education. In the pedagogical technical school, books, training programs, teaching aids, etc. whereas the Armenian People's Commissariat of Education did not want to meet that demand, while there was a great need for its provisions. According to the decision of the Armenian People's Commissioner of Education Ashot Hovanesyan in mid-December 1920, education should be in the mother tongue, schools should be handed over to the state, and new Soviet-type schools should be created free of charge. In 1925, 25 students were enrolled in that preparatory course, and after graduating in early 1926, they began teaching in the field.

While the Dashnak government of Soviet Armenia provided the Armenian Pedagogical Technical College with a separate building and showed great care and attention, the Turkish Pedagogical Technical College was deprived of these cares. If that discriminatory policy showed that the "Soviet government" in Armenia had its own characteristics, on the other hand, it was manifested by the fact that the Armenian communists acted according to completely different principles in words and deeds. Because, unlike other republics, there were two sides of party life, national politics and social environment in Armenia: the first - visible, the second - invisible. The visible side was the "implementation of the ideas of Bolshevism", "proletarian internationalism", and the invisible side was the anti-Turkish and chauvinist policies carried out secretly by the official leadership of Armenia.

As mentioned, one of the insidious goals of the Armenian chauvinists, who tried to prevent the development of our national education in every possible way, was to lay the foundation for the end of the Turkish pedagogical technical school in the future.

However, despite all these difficulties and serious obstacles, strengthening the newly created technical school, revitalizing its activities, creating a teacher-student union, organizing education, etc. were the most important issues facing our hard-working intellectuals. These intellectuals include B. Efendiyev, director of the "Minorities Department", M. Kazimov, director of the technical school, M. Huseynov, editor-in-chief of "Zengi" newspaper, and others.

If we look at the first period of the activity of the technical school, the organization of the pedagogical team, teaching, etc. some progress has been made in these areas. In a short time, intellectuals such as Asgar Asgarzade, Ismayil Babayev, Ashraf Bayramov, Muhammad Azimzade, Miryusif Mirbabayev, Bulbul Kazimova began to gather around this educational center [5]. It should be noted that the world-renowned academician and scientist Yusif Mammadaliyev

started his career in this technical school. During the years 1926-27, he taught biology and chemistry at the educational institution. At that time, an important pedagogue, Latif Huseynzade, was teaching at the technical school for a while.

It should be noted that the Turkish Pedagogical Technical College played a great role not only as an educational institution, but also in the development and formation of Azerbaijani literature, culture and art in Yerevan.

Mass genocide of Azerbaijanis by Armenians in 1918-20 led to the decline of Yerevan's literary and cultural environment. One of the prominent representatives of the literary and cultural circle was destroyed, and some of them went to Turkey, Iran, Central Asia, Azerbaijan and other countries to avoid being mercilessly killed. With that, since there are no intellectuals of the older generation left in Yerevan, the relations between the predecessors and the followers have been completely broken. Undoubtedly, all of these could not affect the creative potential of the Yerevan literary school.

After the revolution, the students and teachers of the Turkish Pedagogical Technical College provided exceptional services in the revival, development and formation of the eternal cultural environment of Azerbaijan in Yerevan. Thus, the teaching and student staff of the technical school had a great role in promoting and promoting the newspaper "Zengi" (1924), which was the only printing house in Yerevan in the Azerbaijani language, and in increasing its circulation. the introduction of the new Turkish alphabet and the eradication of illiteracy. Active supporters and reporters of "Zengi" newspaper were teachers and students of this educational institution. Mehdi Bashirov, Taghi Jamalov, Rustam Taghiyev, Telman Nazarli, Nariman Fakhri, Gasim Aliyev, Yunis Taghiyev, Abbas Tahir, Aligulu Salimov, Abulfat Rahimov, Abilfat Ibrahim, Musa Gafarov, Adil Akhundov, Shamoyev Hatamov, Nurali Gurbanov, Nazar Pashayev, etc. They were the most active reporters in "Zengi" newspaper.

In the revival and expansion of this educational institution, the Azerbaijani branch, which was organized under the Society of Proletarian Writers of Armenia in 1927, rendered a great service.

In June 1929, the first graduation of the technical school took place. In 1926, 20 of the 32 students, 18 boys and 2 girls, were able to graduate from the technical school. From the information given by the sources, it is understood that 3 of the students died of a serious and infectious disease while studying, and 9 had to leave the technical school, interrupting their studies for various reasons.

Among the first alumni are Amir Abasguluyev, Adil Akhundov, Nariman Aliyev, Pasha Makinski, Abulfat Ibrahim, Imangulu Karimov, Nariman Fakhri, Rubaba Baghirbeyova, Nasir Aliyev, Musa Gafarov, Abulfat Rahimov, Taghi Bagirov, Nazar Pashayev, Mirza Bashirov.

Professors such as Nariman Aliyev, Zarifa Budagova, Budaq Budaqov, Yusif Yusifov, Farhad Farhadov, Nazəar Pashayev, Suleyman Mammadov, Ali Farajov, Gurban Bayramov, Abbas Ismayilov, Jafar Jafarov, Hamid Aliyev, Khadim Maharramov, Gasim Mustafayev, Sabir Safarov, Hamid Efendiyev, Abbas Tahir, Nariman Kazimov, Jabbar Guliyev, Zahra Aliyeva, Nariman Yusifov, Kovsar Tarverdiyeva, Gasham Aslanov, Habib Hasanov , Tapdig Amiraslanov, Mammadali Maharramov, Jumayil Mardanov, honored teacher Shafiga Maharramova and others were graduated from this school [9].

Despite all this, the introduction of general compulsory education in 1930 was an impetus for the rapid growth of the number of both schools and all students studying there. Thus, in the academic year of 1922-23, there were 36 Azerbaijani schools operating in Western Azerbaijan, 62 in 1924, 112 in 1929-1930, and a total of 245 in 1931. 45 of them were discovered in Iravan region. The

management of these schools and the provision of teaching staff were among the most important issues of the day. Because the pedagogical technical school, which graduates 20-30 people per year, could not fully meet the demand for teachers of our national schools. Due to the lack of teachers, many schools in the regions had to rely on those studying in two-month and three-month preparatory courses. Due to the lack of teaching staff, the students of the pedagogical technical school worked alternately as teachers in the 1st grade Turkish schools operating in Yerevan, in the village house and in the women's club. Even graduates of the 9-year Turkish school in Yerevan were sent to work as teachers in order to partially eliminate the need for teaching staff in Azerbaijani schools.

However, despite all this, despite the great demand for teaching staff in Azerbaijani schools, hundreds of Azerbaijani teachers and students are called "gentleman", "khan", "mulkadar", "gölkomak", "kulek", "superstition". They were stigmatized and expelled from educational institutions. The students of the Technical College Faramez Kazimbayov, Mikayil Aliyev, Alakbar Hasanzadeh, Khalil Efendiyev, Tarifa Ismikhanova, Farhad Asgarov, Muhammad Rzayev, Ali Khalilov, Akbar Jabbar Haji Hasanoglu, Maharram Khalilov, Anvar Gaziyev, Gadimali Valiyev called for an investigation. Azeri intellectuals were subjected not only to oppression, but also to physical terror.

Beləliklə, erməni şovinizmi kontekstində üzləşdiyi bütün çətinliklərə və maneələrə baxmayaraq, Türk Pedaqoji Texniki Kolleci əldə etdiyi uğurlarla təhsil sistemindəki yerini daha da möhkəmləndirmişdir. Bu texnikum Cənubi Qafqazda orta məktəb səviyyəsində böyük uğurlar qazana bilmişdir. 1934-cü ildə İrəvan Türk Pedaqoji Texnikumu Ümumittifaq texnikumlar müsabiqəsində birinci yeri tutaraq 7000 manat pul mükafatı alır.

1934-cü ildə pedaqoji texnikumda Müzəffər Nəsirli, Nəsib Əfəndiyev, Nəzər Paşayev, Abbas Azəri, Zəhra Abbasova, Tacirə Bağırova, Kərəm Abbasov, Məmməd Həsənov kimi korifeylər dərs demişlər. Texnikumda yüksək hazırlıqlı pedaqoqların olması tədrisin keyfiyyətinin yüksəlməsinə səbəb oldu. 1935-ci ildə Məmməd Səid Ordubadi, Mehdi Hüseyn, Mikayıl Müşfiq və başqalarından ibarət nümayəndə heyəti İrəvana səfəri zamanı Pedaqoji Texnikumun müəllim və tələbələri ilə görüşdü.

In general, important prominent intellectuals of Azerbaijan - Ali Nazim, Jalil Mammadguluzade, Yusif Vazir Chamanzaminli, Mir Jalal, Samad Vurgun, Sabit Rahman, Abulhasan, Mikayil Rafili, Nigar Rafibeyli, Suleyman Rustam, Vali Huluflu and others were guests of this educational center. Yerevan Azerbaijan Pedagogical School has trained 1,370 secondary-educated pedagogical personnel from the days of its establishment to the middle of 1947.

If you follow the activities of the pedagogical school, it becomes clear that this educational institution was headed by Bahlul Yusifov, Mehdi Kazimov, Asgar Jafarov, Habib Mahammadzade and Mammad Hasanov, Eyyub Babayev, Raziya Ismayilova, Sadig Heydarzade, Zarri. Thanks to the selfless work of the teachers of the school Gurbanova, Tavakkul Karimov, Habib Akbarov, Huseyn Aliyev, Jafar Alakbarov, Shura Farhadova, Sura Babayeva, Raziya Abdullayeva and others, the high level of education of the students was achieved [8].

The Iravan Turkish Pedagogical School, which operated until 1949, played a great role not only as an educational institution, but also in the formation, development and preservation of our culture, literature, and art in Western Azerbaijan. As a result of the insidious policy of the Armenian bandits under the guise of Bolsheviks, this educational institution, which has passed a great and glorious history and is one of the most glorious pages of our educational history, was subjected to

mass deportations and handed over to the people. In 1949, the Khanlar region of Azerbaijan operated here until 1972.

President Ilham Aliyev visited various regions in connection with the 125th anniversary of the establishment of the Yerevan Azerbaijan Drama Theater on August 30, 2006 and the 125th anniversary of the Uluhanli school of Yerevan district on December 29. On December 29, 2021, he signed an Order on the celebration of the 140th anniversary of the Yerevan Teachers' Seminary [10]. This seminar will encourage the further study, research and promotion of a glorious page in the history of education. His opinions about Iravan, Zangezur, Goycha and other ancient places of our homeland, special facts he revealed about our historical place names, "No Ararat - Zangibasar", "Not Gegarkunik but Goycha", "Not Yeraskh but Arazdeyan", "Not Vardenis but Basarkecher" , "Not Tavush but Dilijan", "Not Syunik but Zangezur", "Not Lori but Dag Borchali", "Not Vayochdzor but Derelayaz" once again confirm the undeniable and irrefutable facts. We must never forget our history, national and moral values.

Conclusion

Irevan, the ancient land of Azerbaijan, which is one of the glorious pages of our educational history, the study of the history of the Teachers' School founded 141 years ago, conferences, round tables and a series of events will continue to be held in this regard. The legacy of this great source of information, which made great contributions to the development of our national education and opened bright pages in our educational history, will continue to shine hundreds of years later. The Yerevan Teachers' Seminary, which has been operating for 37 years, has played an important role in the development of the educational environment in Azerbaijan, including fulfilling its historical mission and creating a new stage.

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APPLICATION OF FUZZY LOGIC IN COMPUTER SYSTEMS OF MEDICAL DIAGNOSIS

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ABSTRACT

The features of medical diagnostics that affect the quality of decision-making in decision support systems are considered. The purpose of this article is to briefly introduce various soft computing methodologies and present various applications in medicine. Formalized expert information on the given sets of diagnoses and their symptoms. A method has been developed for generating a diagnostic inference during therapeutic examinations based on fuzzy logic. The goal is to demonstrate the possibilities of applying soft computing to problems related to medicine. A transition is made from fuzzy values to certain physical parameters that can serve as commands to the actuator. The result of fuzzy inference, of course, will be fuzzy, but for the executive device it means absolutely nothing, therefore, to eliminate fuzziness, special mathematical methods can be applied to obtain the exact values transmitted by a number of diseases directly to the performer in medical diagnostics. Fuzzy logic and fuzzy set theory is a branch of mathematics that generalizes classical logic and set theory. The fuzzy system copes with such a task very quickly, despite the fact that instead of complex differential equations, the entire process of movement is described in terms of natural language: "norm", "average", "high" - as if the operator controls the system.
Keywords: medical diagnostics, fuzzy logic, decision support system, fuzzy systems.

Introduction

Medicine is a poorly structured field of knowledge [1], which creates serious difficulties in building decision-making systems. The latest published data on the use of software computing in medicine are taken from the studied and analyzed literature. This research identifies which methodologies or methodologies for soft computing are often used together to solve special medical problems. According to the database search results, the preference rates for soft computing methodologies in medicine are 70% fuzzy logic-neural networks, 27% neural networks-genetic algorithms and 3% fuzzy logic-genetic algorithms in the results of our study. The diagnostic process in medicine, built on reasoning about signs and their combination, which substantiate or reject a certain diagnostic hypothesis [2], which is actually based on the logic of argumentation, which also includes order relations on multiple arguments. Until now, the methodology of fuzzy logic-neural networks has been widely used in clinical medicine. On the other hand, fundamental medicine mostly preferred neural network-genetic algorithm methodologies and fuzzy logic-genetic algorithm methodologies. At the same time, in practice, the doctor builds a sequence of conclusions based on the idea of the relationship between the symptoms observed in the patient and specific diagnosis [4]. A certain Parallelism in achieving the goal through consideration exists in doctorsand in intelligent systems.

A feature of diagnostic problem situations is that decision-making in this case is characterized by the presence of a human factor at all levels and stages of the management process[3]. In addition, in diagnostic problem situations, the control object is a source of significantly incomplete, inaccurate, fuzzyinformation and contradictions (for example, a device is a source of inaccuracy, a patient in a clinic is asource of fuzziness, inaccuracy and incompleteness).
Thus, the problem of formalization of the medical task is relevant. Diagnostics based on the analysis of heterogeneous diagnostic information, substantiation of the choice of a mathematical apparatus, development of a method for the formation of diagnostic conclusions and its adaptation to a given subjectarea of medicine in order to build a decision support system in medicine.

Methods and models

Diagnostic problem situations have several demanding aspects of scientific analysis and research. First, diagnosis involves the classification of incompletely defined conditions [4]. Secondly, diagnostics has several levels of expertise with a variable composition of a group of experts, which carry out the extraction of information, the detection of patterns and contradictions, the formulation of hypotheses, testing hypotheses, etc. [5]. Thirdly, decision-making has a two-stage organization: instrumental methodsverify signs that confirm or object to hypotheses; a person who makes a decision, builds or uses ready-madelogical rules, accepts a working hypothesis (final diagnosis) and then chooses goals and ways to overcome the formed problem situation [6].
When a diagnostic problem situation arises, the issues of research and analysis of situations by instrumental means with fuzzy information [7] remain insufficiently studied, where it is necessary to coordinate the estimates received from experts, as well as classify diagnostic problem situationsaccording to a variety of criteria.
Medical diagnosis usually includes a thorough examination of the patient to check the presence and strength of some features associated with the suspected disease in order to decide whether the patient hasthis disease or not [8]. A symptom, such as a runny nose, may be more severe in one patient, and may bemild or even very subtle in another. The doctor's experience tells him how to combine a multitude of symptoms (signs and their intensity) to arrive at a correct diagnosis.
In view of the foregoing, fuzzy logic [9, 10], which is successfully used in medical diagnostic systems [9], was chosen as the mathematical apparatus for analyzing expert information and the results of instrumental studies of patients. But when it is used in a specific subject area of medicine (therapeutic examination), it is necessary to formalize expert information regarding the given sets of diagnoses and their symptoms, to coordinate the results of instrumental studies of patients with expert assessments, andto develop a methodology for the formation of a diagnostic conclusion.

Statement of the problem

The concept of a fuzzy set generalizes the concept of a classical set (characteristic function). A fuzzy set A in a universe U is defined as a mapping A : UL, i.e., A assigns to each element u of U a degree A(u) from the scale L of degrees of truth, called the degree of membership of u to A. If L [0, 1], Usually we talk about standard fuzzy sets. It is clear that if L {0, 1}, we obtain the concept of the characteristic concept of an ordinary set.
Formalization of the task of medical diagnostics, development of a methodology for the formation of a diagnostic conclusion during therapeutic examinations based on fuzzy logic
We consider multiple diseases D = { d 1 , d 2 , ..., d m }

And also determine multiple symptoms F = { f 1 , f 2 , ..., f n } of these diseases. Usually we have n >> m.

To describe the patient's symptoms, checking the symptoms in the set F will be performed, after which each variable will be assigned a fuzzy value. The set of fuzzy values is represented by the following set:very low, low, moderate, high, very high.

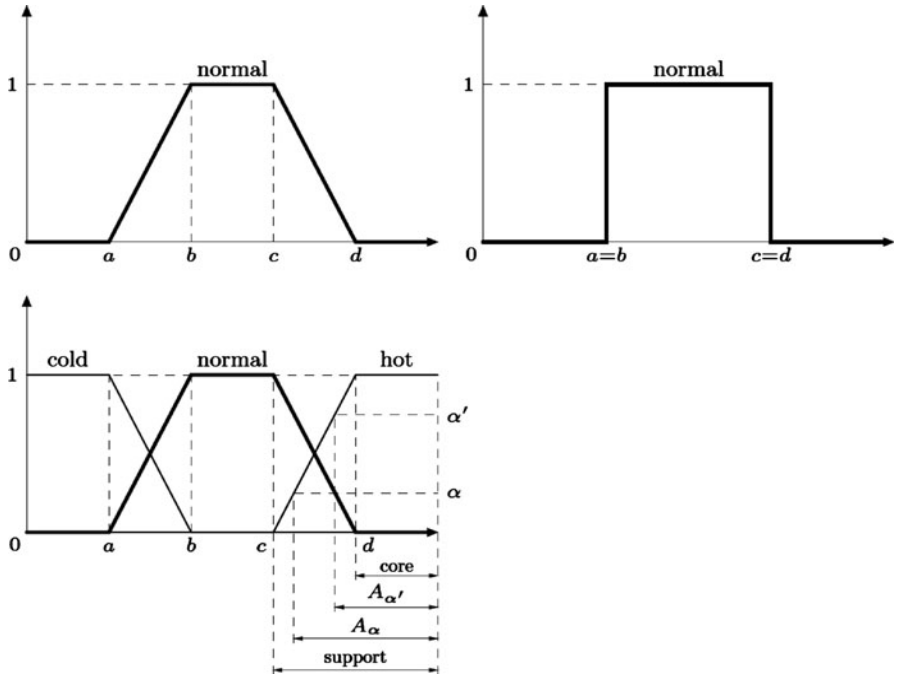
Concepts and operations associated with fuzzy sets include both analogues of concepts and operations from classical sets, as well as new ones. An important example of the latter is the concept of an a-cut, which for a ∈ L and a fuzzy set A is defined as the usual

a subset aA of U defined by the formula aA 0 {u ∈ U j A(u) ≥ a}. Fuzzy set A is unique

Having compared the patient's symptoms with all n elements of the plural number of symptoms F and assigning the necessary fuzzy value to each component, the plural number of symptoms of the patient Swill have the following form:

$$S = \{ \langle f_1 , v_1 \rangle, \langle f_2 , v_2 \rangle, ..., \langle f_n , v_n \rangle \},$$

where $v1$ is an imprecise meaning assigned to the symptom $f2$ when examining the patient, $u = 1, 2, ..., n$.



The experience of the expert doctor regarding the set of considered diseases D is stored in a set of fuzzytables, each of which sets a profile for one disease. We will consider three vague meanings "Yes", "Maybe" and "No", as shown in Fig.1, for detecting the presence of disease. Entries in the disease profiletables will be formed from these linguistic variables [9].

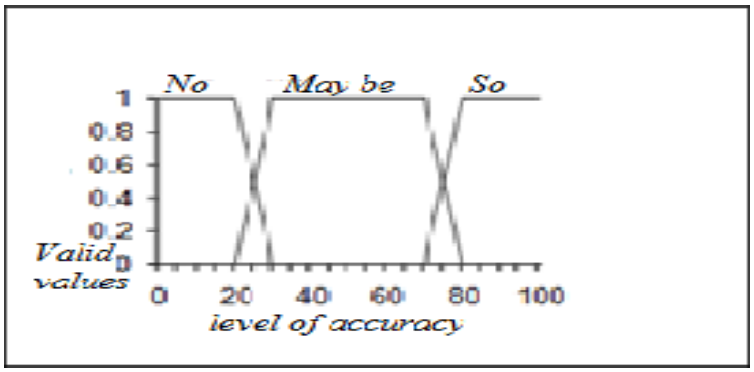


Figure 1. Unclear meaning for establishing a diagnosis.

For each i -th disease, a set R i (i = 1, 2, …, k i) formed with k i ≤ n is corresponding symptoms, which is a subset of the plural F. The task of the expert is to set the appropriate value for each element in the table of disease profiles from his experience. This must be done for each disease in set D.
Table.1 illustrates a fragment of a profile for a common upper respiratory tract infection based on expert advicefrom a physician.

Solution of the problem
Consider the process of diagnosing a patient and obtaining a set of his symptoms *S*. An example of such a set is given in the Table. 2, which shows fuzzy value for all symptoms in the common plural F.

Table 1. Profile for Influenza

Attributes Symptoms	Very short	Short	Moderate	High	Very high
Runny nose	No	No	Maybe	Yes	Yes
Fever	No	Maybe	Yes	Yes	Yes
Cough	No	Maybe	Yes	Yes	Yes
brittleness V body	No	Maybe	Yes	Yes	Yes
Main pain	No	Maybe	Yes	Yes	Yes
Increase lymphatic nodes	No	No	Maybe	Maybe	Maybe

Table 2. Table of patient symptoms.

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Symptom	Unclear value *
Cold	P
Rash light pink color	DN
Fever	IN
Cough	P
Abrupt and fragmentary cough	DN
Fragility in body	N
Main pain	N
Sensitivity to light	DN
Conjunctivitis	IN

Symptom	Unclear value *
Increase lymph nodes by years	DN
Pain in joints	DN
Magnification lymphatic nodes in neck	P
Weakness	DV
Nausea	P
Pain in throat	P
Itching	DN
Loss appetite	N
Convulsions	DN

DV = very much tall, IN = tall, P = moderate N = low, DN = very much low

It is quite natural that the size of non-numeric values of symptoms is represented by fuzzy values. However, there are other symptoms such as temperature, pressure, blood sugar, etc. that can be given a numerical value. Such values should be properly reduced to a fuzzy value.

Let be:

– $s\,[\,f\,]$ – fuzzy value of symptom f in the input multiple of symptoms;

-$r\,i\,j$ – j --th symptom of i -th diagnosis $u = 1, 2, ..., n$; $j = 1, 2, ..., m$;

–$P\,i\,j\,[\,r\,i\,j\,,\,v\,]$ – percentage of confidence in the u-mu diagnosis with a fuzzy value v of the symptom $r\,i\,j$;

–$\delta\,i\,j$ – diagnostic decision regarding the i-th diagnosis, which is based on the corresponding symptom $r\,ij$;

$k\,i$ – the total number of relevant symptoms for the i-th diagnosis;

$w\,ij$ – weight $r\,ij$ symptom in diagnosing the i-th disease;

$\sigma\,i$ – general diagnostic decision regarding u-th disease.

The impact of the symptom $r\,ij$ on the diagnostic decision can be obtained directly from the diseaseprofile table $P\,ij\,[\,r\,ij\,,\,v\,]$.

The fuzzy value v is obtained from the patient's symptom $r\,i\,j$ as $v\,j$. The value $\delta\,i\,j$ will be assigned one of the values of the fuzzy set "Yes", "Maybe" and "No". It can be represented as follows:

$$\delta\,i\,j = P\,i\,j\,[\,r\,i\,j\,,\,v\,j\,] \qquad (1)$$

Summing up the effect of all k i corresponding functions, the overall diagnostic solution for the u-th disease is obtained as follows:

$$\sigma_i = \frac{(\sum_{i=1}^{j=k} w_{ij}\,\delta_{ij})}{(\sum_{i=1}^{j=k} w_{ij})} \qquad (2)$$

The weighting coefficient w_{ij} is entered here so that the clinician can indicate that some symptoms may be more or less important than others in diagnosing the disease, and he must set the appropriate relative values of the weights. If all symptoms have the same value, then the weighting factor will be equal to one for all functions. In this case, expression (2) can be simplified to:

$$\sigma_i = \frac{1}{k_i} \sum_{i=1}^{j=k_i} \delta_{ij} \qquad (3)$$

The last step is to get hard values [10], which determine the probability of having each disease in the multiple *D*. To show how to get such hard values, consider the following example. Let's assume that the given disease is *d* and, that it has 10 symptoms corresponding to it, each of which has the same weight in the diagnosis.

Let us assume that when using expression (1), diagnostic solutions were obtained corresponding 7 "Yes", 2 "Maybe" and 1 "No". The general diagnostic solution will look like:

σ_i = (7 "Yes" + 2 "Maybe" + 1 "No") / 10.

The resulting fuzzy plural is shown in fig. 2.

Let:

- with *i* - the center of the weights of the total fuzzy plural solution;
- with *y* - the center of the scales for the fuzzy value "Yes";
– q_i – certainty of the presence of the considered disease d_i in percent.

Therefore, the clear disease decision value d_i will be calculated as shown below. It should be noted that if for all relevant symptoms of the diagnosis d_i the value of the linguistic variable is "Yes", then the solution will have 100%.

$$q_i = \left(\frac{c_i}{c_y}\right) \times 100\% \qquad (4)$$

For this example, the value c_u = 0,69 and c_y = 0,87.

This suggests that the confidence in the presence of the disease in question is 79%.

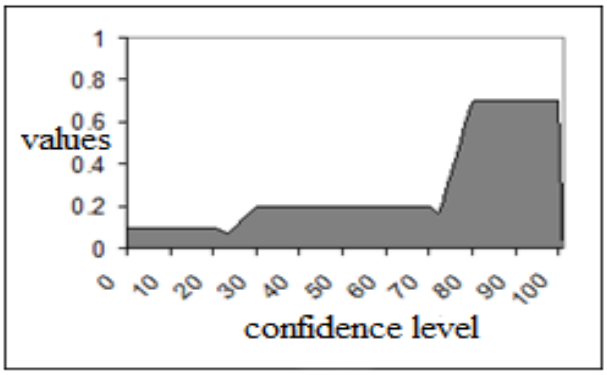

Figure 2. Fuzzy plural that constitutes a common diagnostic decision.

Processing of measured values. Symptoms that have measurable values, such as temperature, blood sugar, etc., will be indicated as a numerical value. For simplicity, fixed tables prepared by the clinician can be used to reflect these numerical values as fuzzy values from the set (very low, low, moderate, high, very high). This solution may be appropriate in some cases. However, let's consider a solution that is more accurate and avoids sudden fluctuations in Figure 3. In fig. 3 shows fuzzy sets with four values, which reflect the level of glucose in the blood. If the measured value, for example, is equal to 8.7%, then this value will be carried away to fuzzy variable "medium" with a coefficient value of 0.3 and "High" with a coefficient value of 0.7.

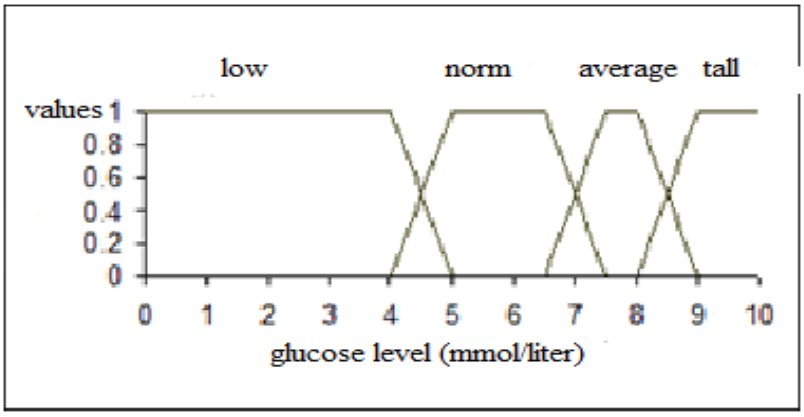

Figure 3. Fuzzy, plural of blood sugar.

Assume that the following information is stored in the profiles of some disease $d\ u$:

– if the sugar level is “average”, then the confidence in the diagnosis is $d\ u$ and "Maybe".

- if the sugar level is "high", then the confidence in the diagnosis is $d\ u$ and "Yes".

- if the sugar level is "high", then the confidence in the diagnosis is $d\ u$ and "Yes".

In this, a diagnostic decision δ_{ij} for disease d and based on a blood sugar value of 8.7% will be made based on two fuzzy values: "Maybe" with a coefficient of 0.3 and "Yes" with a coefficient of 0.7, as shown in fig. 4.

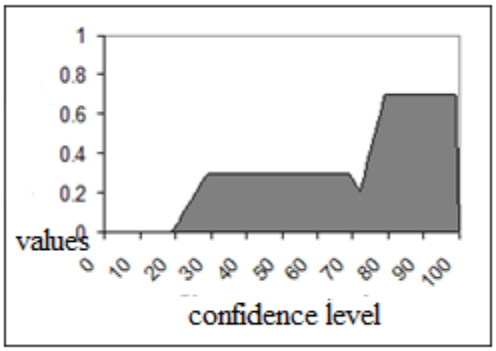

Figure 4. Fuzzy plural diagnostic decision based on blood sugar value (8.7%)

This decision can be generalized to include other numerical values, such as blood pressure.
In this case, this measure can consist of four possible fuzzy sets and has an applied minimum rule for combining pairs of fuzzy sets using the "AND" operator.

Conclusions

Clustering was carried out for different numbers of clusters. The validity of the resulting sections was compared on the basis of the indicators used. As a result of the work, expert information about given complexes of diagnoses and their symptoms during therapeutic examinations was formalized. Each fuzzy cluster corresponds to one fuzzy rule. Intensity indicates the strength of a particular rule. Fuzzy regions represent fuzzy clusters, and intensity indicates the degree of membership. The ends of fuzzy partitions are obtained in each area by projections of multidimensional cluster centers. It is proposed to form disease profiles and store them in the form of fuzzy tables. A method for generating a diagnostic conclusion based on fuzzy logic has been developed. A test check of the performance of the developed method was carried out.

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CREATING A DATA PROCESSING SYSTEM FOR THERAPY DEPARTMENT

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ABSTRACT

Over the past few decades, medical ideas and technologies that were previously considered science fiction have rapidly burst into basic and clinical medicine, allowing it to make a transition from standardized treatment methods to individual selection of medicines, taking into account the genetic characteristics of each individual patient. In addition, the generation of ideas at the intersection of medicine and information technology is changing the usual approaches to health monitoring and treatment. In this context, considering medicine as a complex and specific field of activity, which is characterized by a very high level of heterogeneous medical and economic information, two tasks are updated - optimization of the clinical and economic activities of a medical institution. The ultimate goal of these tasks is to optimize the performance of the healthcare system in general and any medical institution in particular. The introducing of automatic systems for processing and analyzing large volumes of data is relevant not only in clinical practice, but also in the healthcare system as a whole for planning the financing and management of medical organizations, monitoring the circulation of medicines and pricing throughout the country, taking into account the characteristics of each region, for achieving better efficiency. The article is devoted to the creation of functional circuit medical department disease, data processing, definition of technological schemes of the department,describe the history of the disease formatting.
Keywords: database (DB), IS (information systems), EJ (extract journal)

Introduction

The urgency of the problem. Recently, the interest in the application of computational techniques to medicine is increasing. This is explained by the possibilities of computing tools, first of all, modern personal computers. These computers are suitable for automation of information processing in various fields of human activity. The dimensions of personal computers allow them to be placed directly at the user's workplace, but the ease of communication with the computer makes them available to a wide range of users - non-programmers [1,2,4].

Modern computers have high processing speeds and the volume of practical memory is sufficient for processing large arrays of information, such as applications in the medical field, for example, in Medical statistics, which allows to significantly reduce manual labor costs, increase the quality and accuracy of work, and shorten the time of obtaining the final result.

From this point of view, the created system is dedicated to solving the problem. The importance of this project is that information systems software is important to all health care facilities, but since virtually every health care facility has its own specifications, these systems are rarely delivered ready-made [3,5].

Problem statement

The creation of a data processing system for the therapy department is considered the most important for solving the problem ahead. The process of creating a system requires solving the following main issues:

- analyzing the characteristics and specifications of automated information systems in medicine;
- analysis of the technology of the work of automated departments;
- determining the necessary input and output information;
- developing the structure of the database;
- development and debugging of the program.

The solution of the problem

Ensuring the health of the population requires constant collection and storage of data. Expenditures for the creation and operation of the data collection, storage, processing and transmission system constitute a constant and significantly increasing part of the budget of medical institutions. Various medical information systems (MIS) are being developed and applied to reduce these costs in further improvements of information processing and description, as well as to improve the performance of medical facilities [7].

The automation of medical diagnosis means the complex application of written and technical methods used to increase the accuracy, reliability and reproducibility of medical diagnosis. Automation means transferring some or part of the doctor's functions to devices and automata, or it means automating any of the stages of making a diagnosis, or it means a whole treatment process. Meanwhile, such tasks of medical diagnosis can be automated, for which there are alternatives, and in principle medical personnel may not participate in them.

In the first stage of automation, the standardization of medical histories for various purposes is processed, the doctor writes the data collected about the patient in the form of text or numbers according to the schedule of the standardized document, which are also transferred to the computer's memory.

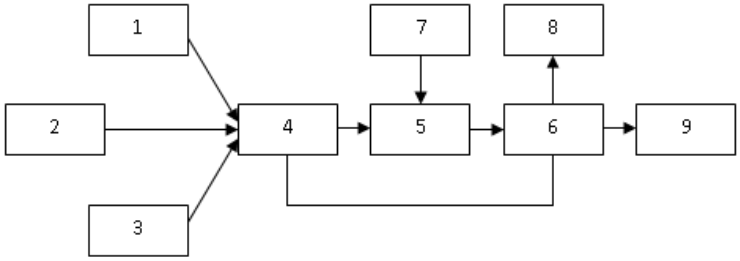
In the second stage, they separate, process, analyze and evaluate the collected data. It selects the symptoms and then evaluates its importance.

In the third stage, the disease model is established and diagnosed. At this time, the appropriate structure is established according to the diagnosis of the doctor or computer, that is, when making a decision on the evaluation of the data, the main and relevant diseases about the patient are shown, which indicate the functional state of the body systems or organs. In such automation of diagnosis, the last final decision is made by the doctor. Thus, the automation of the diagnosis process is directly related to the algorithmization of medical data.

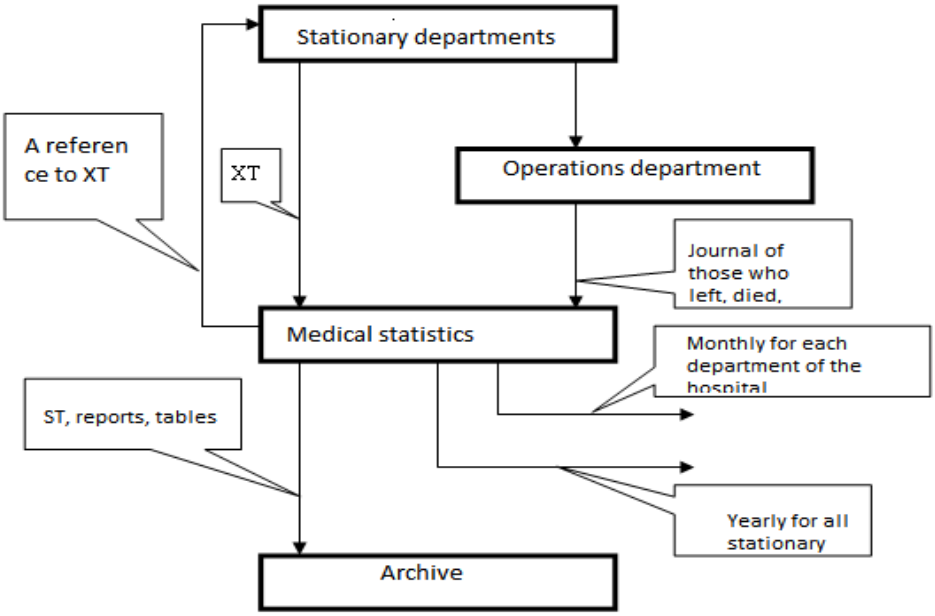
When making a diagnosis in the fourth stage, the doctor acts according to certain rules, that is, the programs act according to algorithms (as learned or according to the rules that he himself designed in practice). Discussing the process of making a diagnosis from a cybernetic point of view makes it possible to obtain algorithms for diagnoses, as well as to make possible computer medical care and to automate the diagnostic process. Algorithms determined during data analysis are called logical algorithms because they are possible as a result of logical operations. They are divided into two groups:

- matrix (table);
- probable.

The first group of algorithms is used in the diagnosis of a disease defined by a simple set of easily known symptoms. In other cases, diagnosis is always based on experience, so that no disease manifests itself exactly as it is written in books, in individual persons or cases. That's why the doctor must constantly check to make the correct diagnosis.
Algorithms based on clinical pattern retrieval are also applied on the computer.



This is the circuit block of operations carried out by the computer. Here:
1. data of inquiry and review;
2. laboratory clinical data;
3. results of physiological studies;
4. operative collection of data;
5. comparing the collected data with the constant of various medical indicators;
6. comparison of isolated symptoms and inconsistencies with symptom complexes;
7. the limits of the anonymous constant given norms;
8. memorization of symptom complexes, logical connections between them, etc.;
9. providing the final result (diagnosis).
The following diagnostic tasks can be performed on the computer:
1. list of possible diagnoses;
2. determination of further diagnostic tests;
3. calculating the probability of alternative diagnoses;
4. providing treatment recommendations;
5. compile a statistical table of indicators for symptoms, diagnoses and appropriate treatment;
6. calculate the amount of complex diagnostic operations, rules;
7. providing current information about new treatment drugs and diagnostic methods;
8. collecting and providing necessary information about a separate patient.
The technological scheme of the work of the department. It has a medical statistics department to provide hospital employees with various categories of operational data and to form report materials on the department's treatment activities.
Let's look at the technology of medical statistics work when entering information from the inpatient therapy department. The diagram below shows the functional connection scheme of the therapy department with other departments of the hospital during the entry of information about admitted patients.



Medical statistics include medical history completed by a physician. In the departments of medical statistics, the data of the logbook of discharged, deceased and transferred patients are reconciled with the medical dates of those who were discharged. Records are made of the medical history of those discharged to the hospital. Then it consists of a report on the medical history of the discharged patients who were transferred back to the department. The entered medical records are sent to the archive for storage. The forms are collected in the folders of the departments to prepare a report on the activity of the inpatient. Then, on the basis of the form, the following report forms are prepared for inpatient departments, accounting and hospital administration in the departments of medical statistics:

- monthly report for each department;
- annual report on all stationary:

1. Composition of patients in the hospital, treatment duration and result;
2. Composition of admitted patients and the result of their treatment;
3. Surgical work of the institution;
4. Distribution of patients by age and region;
5. Patients transferred to other treatment facilities;
6. Nosology of patients transferred from other inpatients;
7. Table of the dead nosology;
8. Nosology of infected patients;
9. Distribution of infected patients by departments;
10. Distribution of hospitalized patients from other places by channels and hospital departments.

Forming a description of the history of the disease. The medical history is a static form that collects the following information and is filled out for each patient:

1. Number of the patient's medical record;
2. Patient's name, surname, father's name;
3. Sex of the patient;
4. Date of birth;

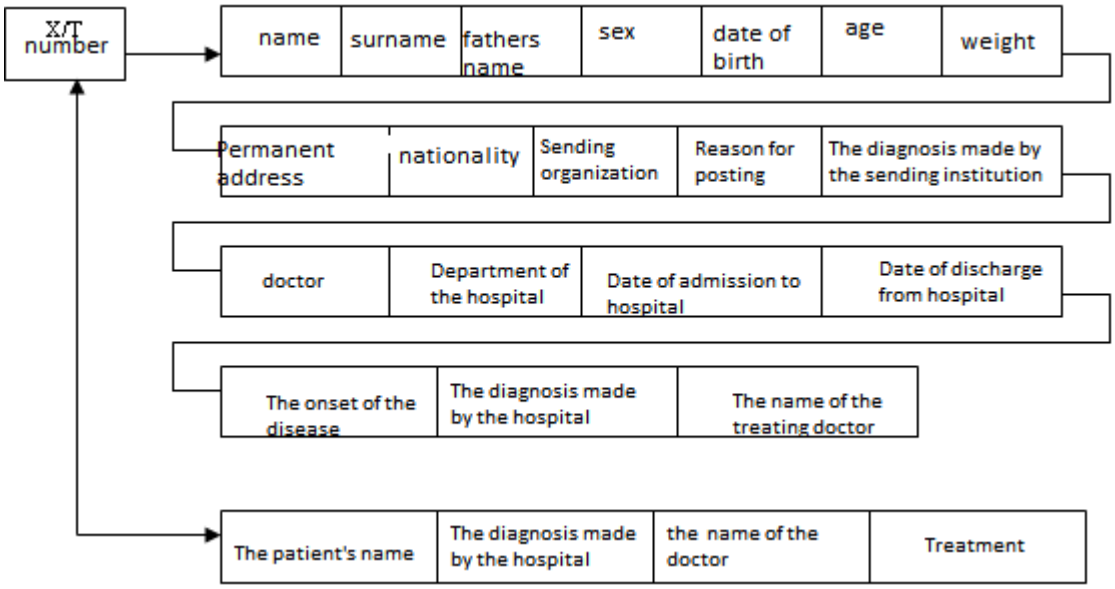
5. Age;
6. Weight;
7. Permanent residence address;
8. Nationality;
9. Sending organization; The reason for the shipment; The diagnosis made by the sending institution;
10. Diagnosing doctor;
11. Department of the hospital;
12. Date and time of admission to the hospital;
13. The onset period of the disease;
14. Diagnosis made by the hospital;
15. The treating doctor's a.,a.a.,s. and so on.

The most common diseases in the therapy department have been investigated and they include the following:

1. Diseases of respiratory organs;
2. Heart and vascular diseases;
3. Diseases of digestive organs;
4. Kidney diseases;
5. Diffuse connective tissue diseases;
6. Diseases of the joints;
7. Diseases of the hematopoietic system;
8. Diseases of the endocrine system.

The conceptual scheme of the database on the subject area is built on the basis of the relational model. Among the existing information models, the relational model is significantly different in a positive sense due to its compactness and the possibility of performing operations on the data.

A conceptual model for storing information on therapy diseases is described in the following figure.



Conclusion

One of the main requirements for the information system is the creation of a user-friendly interface. So, usually, the main (end) users of the system have little or no computer literacy. Therefore, when creating a new automated information system, they always try to make its interface convenient, clear, classified and structured.

Before creating the interface of the system, its working modes are defined and the working modes are grouped according to their purpose, as a result, the algorithms of each mode are defined, the user should perform the necessary operation without suffering.

In the article, the requirements, structural dependencies, and their constituent parts were investigated in the subject area studied in the article, and as a result, the creation of an information-search system of patient registration for the therapy department is the creation of an information system consisting of visibility and registration.

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SYSTEM OF DETECTION OF VENTRICULAR ARRHYTHMIYS

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ABSTRACT

Determining the boundaries of QRS complexes in ECG signals is of fundamental importance in the diagnosis of arrhythmias and in the recognition of signals in clinical manifestations in general. Existing systems of mobile diagnostics of arrhythmias do not meet modern requirements: some algorithms are too complicated for software implementation, others are not sufficiently resistant to interference. Ventricular extrasystoles, as one of the most important studies in arrhythmology, are currently considered one of the main causes of sudden cardiac death, and their timely detection and objective diagnosis, as well as proper prevention, remain one of the most pressing issues. One of the urgent issues is the development of simple (acceptable for mobile devices – which can be implemented online) algorithms for the recognition and classification of ventricular arrhythmias.
The aim of the work is to develop a system for determining the informative parameters of the ECG signal in real time for the diagnosis of ventricular extrasystoles and parameters of heart rate variability. An algorithm for recognition of arrhythmias (ventricular extrasystoles) is proposed, which is characterized by ease of implementation and minimal requirements for computing resources, while maintaining high values of sensitivity and specificity for ECG signals with sinus rhythm and single ventricular extrasystoles. The algorithm is implemented in the Labview software environment. Using ECG files taken from international databases, the algorithm and system were tested to determine the parameters of heart rate variability.
Keywords: electrocardiographic signal, arrhythmia, heart rate variability, ventricular extrasystole

Introduction

According to the World Health Organization, the number of people dying from cardiovascular diseases is in first place compared to all other diseases. Ventricular arrhythmias from cardiovascular disease are considered one of the leading causes of sudden death. Blood circulation can stop during arrhythmias, which means that all pathological processes that can occur in cardiac activity are related to each other, including arrhythmias. The second reason for sudden death is the failure to provide the patient with timely medical care. Therefore, the creation of heart rhythm diagnostic capabilities and the online implementation of this procedure "at home" using mobile devices in a short time, that is, the implementation of automatic analysis of ECG signals using mobile devices, is one of the tasks. of the current issues of the day. The issue of obtaining automatic mobile clinical diagnostics based on the processing and analysis of ECG signals has not been fully resolved. The currently existing mobile arrhythmia diagnostic systems do not meet modern requirements: some algorithms are too complex for software implementation, others are not sufficiently resistant to interference. Ventricular extrasystoles, as one of the important studies of arrhythmology, are currently considered one of the main causes of sudden cardiac death, their timely detection and objective diagnosis, as well as proper prevention, remain one of the topical issues.

Therefore, the development of simple algorithms (acceptable for mobile devices – which can be implemented online) for the recognition and classification of ventricular arrhythmias is one of the urgent tasks. Recognition and classification of cardiac arrhythmias, especially ventricular extrasystoles, identification of factors that play a key role in the formation of arrhythmias, allows us to clarify many issues that arise in the process of diagnosing and treating arrhythmias.

Problem statement

Most errors in the diagnosis of cardiac arrhythmias occur at the stages of signal detection and recognition. The reasons for this are that the structure of the ECG signal is complex and unstable; when registering the signal, it is affected by various noises, differing in origin, shape, spectral composition and intensity; the location of the electrodes, as well as the dependence of the ECG signal and the electrical conductivity of the tissues on the individual characteristics of the biological object.

The question of the accuracy of determining the boundaries of QRS complexes and the allocation of R peaks in ECG signals is of fundamental importance in the diagnosis of arrhythmias and in the recognition of signals in clinical manifestations in general. Existing methods for detecting QRS complexes can be divided into two large groups: the first group includes high-precision methods designed for basic clinical examinations using several divisions; the second group includes methods used in mobile electrocardiographic devices that allow real-time analysis and are intended for patients with heart failure.

The solution of the problem

A comparative analysis of the main technological methods for constructing algorithms for detecting QRS complexes in ECG signals was considered at different times in numerous studies, for example, in [1-4]. Many approaches have been proposed to detect QRS complexes, such as wavelet transforms [5, 6], algorithms from the field of artificial neural networks [7, 8], genetic algorithms [9], filter banks [10], as well as heuristic methods based on on nonlinear transformations of ECG elements [11].

Algorithms for processing and analyzing ECG signals currently known in the literature for real-time detection of QRS complexes can be summarized by the following scheme: ECG analog-to-digital conversion, low-pass filter (LPF), high-pass filter (HPF), derivative operator, nonlinear converter , sliding window integrator, peak detector, search algorithm.

Experimental results

Using the capabilities of the LabVIEW environment, a virtual system was built for studying heart rate variability, detecting and recognizing rhythm disturbances.

Today, there are many methods for detecting normal and pathological QRS complexes [4,12-16], which practically represent improved previously known methods. These improvements are aimed at eliminating various interferences and applying various transformations for reliable detection and recognition of arrhythmias. However, the problem associated with the unpredictability of the rhythm behavior even in one patient still remains open and raises the question of improving the algorithms for isolating QRS complexes and creating algorithms with minimal requirements for computing resources and maintaining high values of sensitivity and specificity to the studied arrhythmias. To this end, for the recognition of arrhythmias, in contrast to existing algorithms, which are mainly focused on a comparative analysis of the differences in RR intervals with their

averaged values, we have proposed an algorithm based on the analysis of the ratios of these intervals. As is known, at the time of rhythm disturbance, the change in the RR interval is ≥10%. Based on this, we can say that in the case of a normal rhythm, the ratio of two adjacent intervals ΔR_{i-1} and ΔR_i must satisfy the condition

$$\frac{1}{1,1} \le a_i \le \frac{1,1}{1}, \text{ or } 0,9 \le a_i \le 1,1 , \qquad (1)$$

here $a_i = \Delta R_i / \Delta R_{i-1}$. In the case of a normal rhythm, regardless of the absolute lengths of neighboring intervals, condition (1) must be preserved (weakly depends on a particular healthy rhythm). So, the essence of our proposed algorithm is as follows:

1) uploading (or registering online) the ECG data file under study,
2) amplitudes and localizations of R peaks are distinguished,
3) the sequence of lengths of RR intervals $\{\Delta R_i = R_i - R_{i-1}\}$is determined;
4) according to the obtained series of sequences of lengths of RR intervals, a new sequence of such ai elements is determined, which are defined as the ratio of neighboring RR intervals: $\{a_i = \Delta R_i / \Delta R_{i-1}\}$.
5) according to the number of values ai that satisfy the conditions $a_i \le 0,9$ or $a_i \ge 1,1$, the number of extrasystoles or rhythm disturbances is calculated. These conditions correspond to the appearance of pathological intervals, i.e. change in the frequency of contractions by at least 10%. If the number of a_k values corresponding to pathological intervals is equal to n_k, then the number of arrhythmias (extrasystoles) n_e will be determined by the formula $n_e = n_k / 3$.
6) according to the number of rhythm disturbances, diagnostic parameters (sensitivity, specificity) and temporal localization of extrasystoles are determined.

This algorithm was implemented in the LabVIEW 2014 software environment. Figure shows the front panel of the program. The program consists of three subroutines: reading a file, generating cardiointervalograms and signal analysis.

The file is read using the Read Biosignal Express VI function. The configuration of the Read Biosignal Express VI virtual device allows you to access the folder where the file under study is located, cut the desired part from the file, select the desired lead, present the file as a sequence of readings (Waveform Values).

The subroutine for generating a cardiointervalogram is implemented using the WA Online Multiscale Peak Detection VI function, which allows you to select R peaks based on wavelet analysis and localize them in real time.

Using the obtained cardiointervalogram, an analysis of heart rate variability and recognition of arrhythmias was carried out.

Analysis of heart rate variability using the VP included in the HRV Analysis palette includes a histogram, a scatterogram, a fast Fourier transform, an autoregressive spectrum, a short-term Fourier transform and the corresponding informative parameters characterizing heart rate variability: the average length and standard deviation of RR intervals, the mean value and standard deviation of heart rate, spectral parameters, etc.

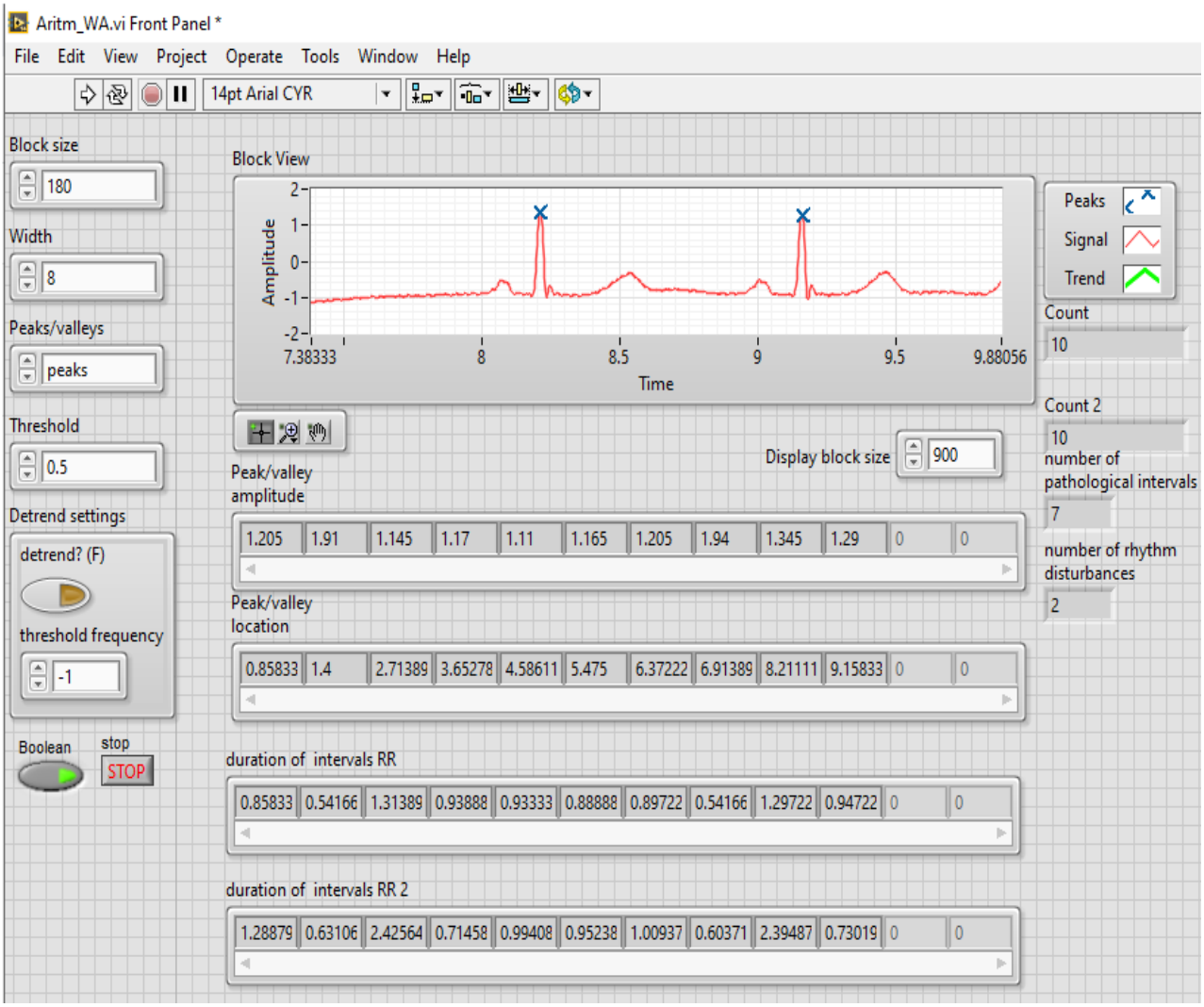

Figure. Program for the analysis of arrhythmias in the LabVIEW environment

Discussion of the results

To test the performance of the proposed algorithm, real signals from the annotated international databases of the Physionet site and from the database of the Massachusetts Institute of Technology (MIT-BIH) were used [17,18]. ECG signals from these bases are considered today as a generally recognized standard for testing software tools intended for cardiology applications. The MIT-BIH Arrhythmia Database contains 48 half-hour extracts from dual-channel ambulatory ECG recordings. Characteristics of the signals of this base: number of leads - 2 (II standard, V1), sampling frequency - 360 Hz; ADC resolution - 11 bits. In addition, stimulated models of ECG signals were also used to test the program.

Table 1 shows the results of testing the program using fragments of various lengths of the 119.hea file taken from the MIT-BIH database.

Table 1. Program test results.

Signal fragment duration	Number of complexes	Real number of extrasystoles	Number of extrasystoles detected by the program	Error
00.00.00- 00.00.10 second	10	2	2	0
00.00.00- 00.00.20 second	21	3	4	+1
00.00.00- 00.00.50 second	55	14	12	-2
00.00.00- 00.00.100 second	108	25	21	-4

Table 2 shows the results of testing the program for the fragment 00.00.00-00.00.10 sec of file 119.hea

Table 2. The results of testing the program for the fragment 00.00.00-00.00.10 sec of file 119.hea.

Localization of observed R peaks, sec	RR interval lengths $\{\Delta R_i = R_i - R_{i-1}\}$	Ratio of neighboring RR intervals: $\{a_i = \Delta R_i/\Delta R_{i-1}$	Belonging to the pathological interval	Number of rhythm disturbances (extrasystoles)
0.858333	0.858333			2
1.4	0.541667	0.631068	Yes	
2.71389	1.31389	2.42564	Yes	
3.65278	0.938889	0.714588	Yes	
4.58611	0.933333	0.994083	No	
5.475	0.888889	0.952381	No	
6.37222	0.897222	1.00937	No	
6.91389	0.541667	0.603715	Yes	
8.21111	1.29722	2.39487	Yes	
9.15833	0.947222	0.730193	Yes	

The results of testing the program, as can be seen from tables 1 and 2, give satisfactory results. Further research showed that this program for signals with sinus rhythm and monotonous extrasystoles gives high results, the reliability of detection of pathological QRS complexes in which is 97-98%. To recognize more complex extrasystoles, this algorithm should be modified taking into account the structural features of extrasystoles.

Conclusıon

The proposed algorithm for recognition of arrhythmias (ventricular extrasystoles) is characterized by ease of implementation and minimal requirements for computing resources, while maintaining high values of sensitivity and specificity for ECG signals with sinus rhythm and single ventricular extrasystoles. The developed program was tested using the ECG signal 119.hea from the MIT BIH database [17], as well as models of ECG signals stimulated in the LabVIEW environment. Statistical analysis of HRV was performed using the HRV Statistics VI included in the Lab view HRV Analysis palette. The results obtained during the processing and analysis of ECG files taken from databases [17, 18] (the diagnostic features of which were known in advance) using a system implemented in the LabVIEW environment confirm their adequacy.

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CURRENT METHODS OF TREATMENT OF SUNKEN CHEST

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Introduction

Sunken chest, also called funnel chest, is the most common deformation of the sternum, which is caused by the posterior depression of the sternum and lower costal cartilages[1,2]. Deformation determines the reduction of the space of the chest cavity and the restriction of the functioning of the organ systems, cardiovascular and respiratory systems in this cavity, which causes the severity of the pathology[3]. Prevalence is 1/300 to 1/1000 live births. 1/5 - female/male, 90% of chest wall deformities are sunken chest. Most of the cases appear in the first year of life. A funnel-shaped chest is formed during puberty. Funnel chest may be present as an isolated anomaly or as a part of various congenital pathologies. Among congenital clinical syndromes, connective tissue diseases are very rare (less than 1%)[4].

Sunken chest etiopathogenesis, genetic factors, associated diseases are diverse and are still the subject of study. Due to the fact, that we have a little information on the etiological factors, and the said deformation and the degree of deformation, determine the pathological functioning of the cardiovascular and respiratory systems, the treatment of deformation is the most urgent, complex and developing issue. Our goal is to present different treatment techniques, discuss and compare treatment method, which is introduced in Georgia.

Treatment methods

The degree of deformation, which is calculated by the "Haller index"[2], and the severity of the disease determine the treatment method. Surgical intervention is the main method of treatment during the development of a sunken chest, however, in the case of a mild degree of the mentioned deformation, other and different approaches are used.

Over two centuries, many surgical techniques have been developed. Some of them are used today.

Invasive interventions:

Ravitch's technique (1949) - modified by Fonkalsrud is an open surgical intervention. The technique is a massive invasive surgical intervention. Reparative procedures involving cartilage resection are straightforward in the 2- to 5-year-old age group, although later-onset chest wall malformations are common after similar interventions at this age, resulting in reduced chest cavity space. The severity of the pathology caused by the mentioned defect is equal to cardiopulmonary disorders caused by a funnel chest. Therefore, Ravitch's technique is mostly used in practice after puberty, although the technique and the results of the intervention, it is also appropriate from the age of 10[5].

Result: after the operation, the patient stays in the clinic for 7 days. The main factor why it remains under the care of a doctor is pain and pleural effusion. After discharge, treatment with anti-inflammatory, pain-relieving drugs continues. The patient is warned not to lie on his side for 3 weeks. The patient is recommended to do deep breathing exercises several times a day. After 3 months, light aerobic exercises can be started. After 6 months upper body lifting.

Fonkalsrud described 275 patients over a 3-year period who underwent surgery with a similar approach. It should be noted that except for 5 patients, all had good results, without serious complications or fatal outcomes [6].
Main intraoperative complication: pneumothorax.
Post-operative complications: wound infection, seroma formation.

Minimally invasive intervention:
Nuss technique - minimally invasive intervention. Modified technique. A small incision of about 2-4 cm is made on the front lower line of the chest, on both sides. After intercostal cryoablation, a metal plate is placed in the chest cavity behind the sternum, which is fixed. In 2 to 4 years, plate removal is the final stage of Nuss surgery[7].
Result: the patient stays in the clinic for several days. 6 weeks postoperatively, a chest radiograph is performed and the location of the plate is assessed. Recommendations are given for weight bearing, supine bed rest for 6 months. Also, heavy physical activity is not allowed before the plate is removed. This intervention is appropriate at the beginning of puberty.
Intraoperative complications: pneumothorax, bleeding from blood vessels in the intercostal space, mechanical damage to the lung or heart.
Post-operative complications: wound infection, acute adhesion events on the plate, seroma formation[8].

Non-invasive intervention:
Vacuum technique. The technique was invented in 2005 by Shier and his colleagues. The device is an aspiration cup that is placed on the chest. The vial is connected to a hand pump that the patient can control. By means of the umbo, the pressure is reduced by 15% compared to the atmospheric pressure, resulting in chest elevation. Initially, the technique was tested on 60 patients, average age - 14.8 years. A vacuum was applied for a minimum of 30 minutes twice a day, for a maximum of 5 hours a day (90 minutes on average).

Result
Chest elevation of 1 cm was observed in 85% within 1 month after the start of treatment. Through further studies, it was established that the patient, on average 11 years old, with a stretchy chest, a depth of concavity of 1.5 cm, is an ideal candidate for the implementation of the mentioned technique.

Side effect
Breast bone pain, skin irritation, hematoma development.

Contraindication
Musculoskeletal diseases, vasculopathies, coagulopathy.
There are different approaches to the implementation of the technique, in particular, some doctors favor the idea that the patient can adjust the pressure, depending on whether he feels comfortable. And some doctors made a protocol and a scheme of using the said technique - a gradual increase in pressure over 6 months, more than 4 hours a day, thus improving the treatment outcome[8].
In Georgia, surgical intervention is performed on the sunken chest In the I.Tsitsishvili children's clinic, the technique used is a modified version of the operative intervention proposed by Nuss.

2016-2023 (within 7 years) - 35 patients were operated on. 80% of these patients are male (28 patients), 20% are female (7 patients). Average age of patients - 14 years. According to the degree of chest deformation, patients before puberty are recommended to use a vacuum under the supervision of a doctor.

Operative technique

A small transverse incision of about 2-3 cm is made in the chest area between the anterior and mid-axial lines, on both sides. A 5mm video port is placed in the 8th-9th intercostal space. From the highest point in front of the chest, a metal plate is placed in the chest cavity between the sternum and the pericardium, which is fixed to the right side of the rib by passing a metal wire through a silicone tube. The need for repeated surgery appears after 3-4 years.

Result

The patient stays in the hospital for an average of 5 days, the postoperative delay period after repeated surgery is relatively small - 2-3 days. Indications and recommendations are given: restriction of weight lifting, analgesia if necessary, chest X-ray in 5-6 weeks, start swimming after 3 months.

Intraoperative complications: mechanical damage to chest cavity organs was noted in 1 patient, mechanical damage to the pericardium occurred. This injury did not require additional intervention.

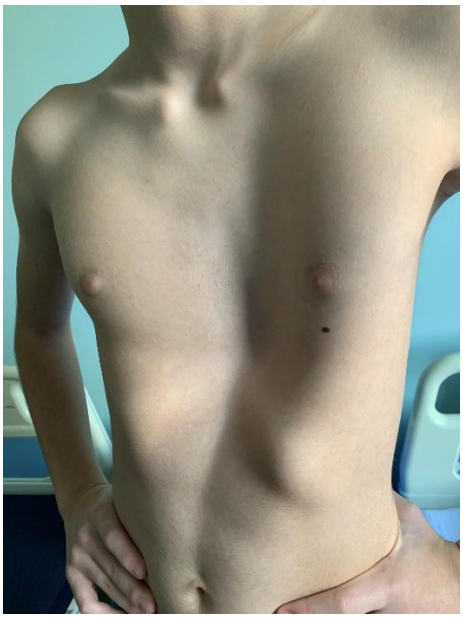
Post-operative complications:

No wound infection was observed, 3 patients had fixation wire breakage 1-2 years after surgery, without dislocation or rotation of the implant.

Sunken chest is the most common problem among chest deformities worldwide. Due to the reduction of the chest cavity and the dislocation of the organs in it, cardiovascular and respiratory system disorders develop, in addition to mild deformation, the patient may suffer psychological damage due to a cosmetic defect. Treatment of the mentioned defect is an important issue. To date, many treatment methods have been developed to eliminate this problem. In the article, "Current Treatment Methods for funnel Chest," we discussed both surgical (invasive and less invasive) and non-invasive approaches that are used today in different parts of the world. Notably, the minimally invasive technique originally developed by Nass and subsequently updated and refined is the gold standard for the treatment of sunken chest. Accordingly, the treatment performed by the pediatric surgeon, Erekle Mosidze, in the children's clinic named after I. Tsitsishvili in Tbilisi, Georgia, is based on the mentioned technique in a modified version.

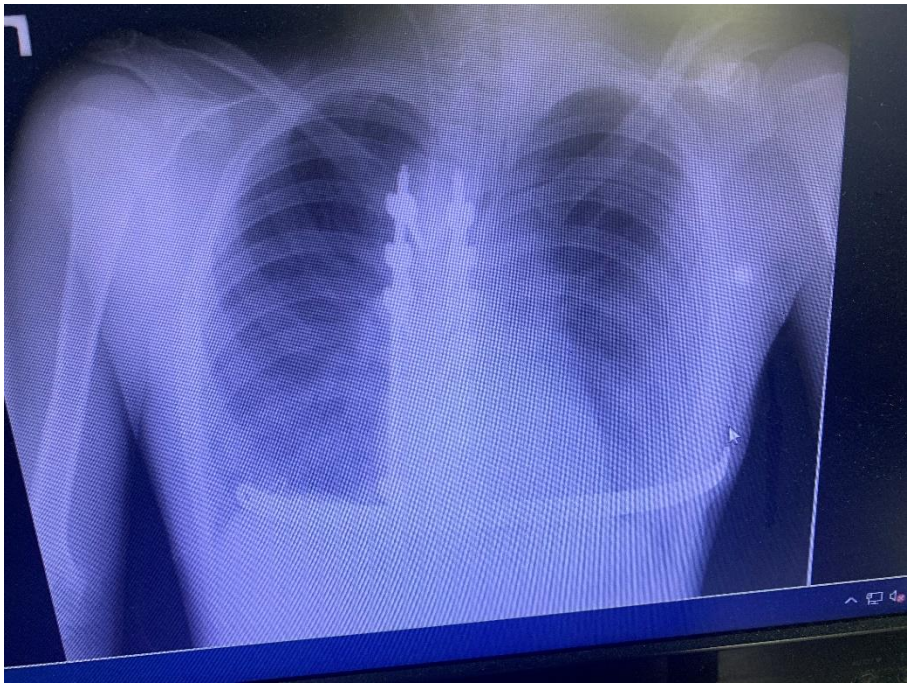
Case report – Pectus Excavatum

Patient S. D. Born on 25.11.2008. He had scoliosis, flat foot and sunken chest. In 2022, an operation was performed - scoliosis correction. In December 2022, a second operation was performed - correction of a funnel chest with our modified version of the Nuss approach. The operation went without complications, the condition after the operation is satisfactory.



Before surgery

After surgery



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MITOCHONDRIA – AS A TARGET OF ENVIRONMENTAL FACTORS

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ABSTRACT

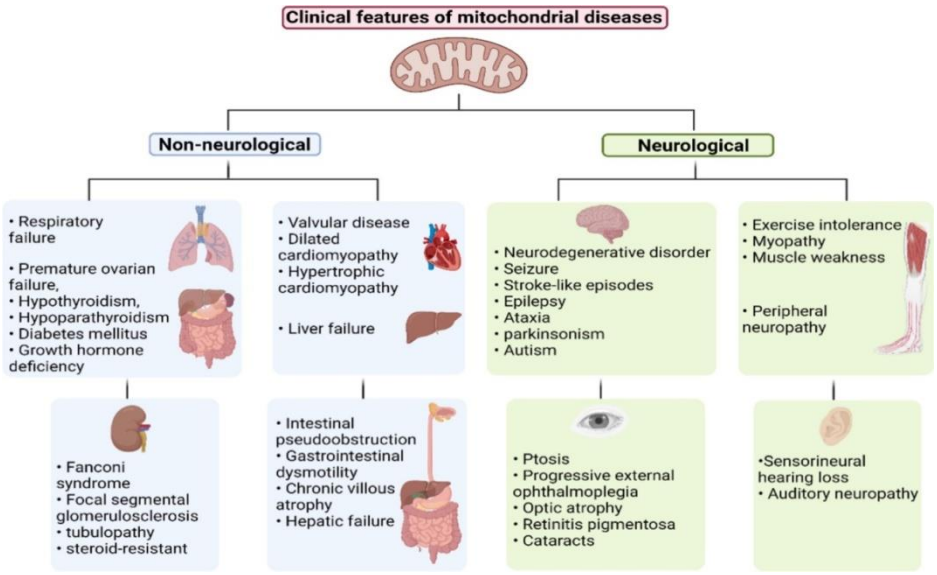
Mitochondria—tiny organelles in the cell that each possess their own DNA—have come under a growing scientific spotlight. The traditional view of mitochondria as static organelles has been reassessed. Scientists increasingly believe they play a central role in many, if not most, human illnesses. Mitochondria are often target of toxicity of environmental toxicants resulting in multisystem disorders involving different cells, tissues, and organs.
The purpose of this review is to discuss the mechanism and consequences of mitochondrial dysfunction caused by environmental factors.
Recognition of the key role of mtDNA integrity and mitochondrial function in health has grown greatly in recent years. The environment can influence human health and disease in many harmful ways. One such mechanism for this is through environmental factors increasing oxidative stress in the cell, and this stress can subsequently lead to alterations in DNA molecule. Research shows that mitochondrial DNA is uniquely susceptible to the damaging effects of reactive oxygen species (ROS). These effects are more extensive and longer-lasting in mitochondrial DNA than they are in the nuclear genome. In humans, the most concerning chemicals may be mitochondrial toxins with long half-lives. Examples include lipophilic chemical mixtures such as persistent organic pollutants (POPs) and heavy metals. Other examples of chronic exposure to mitochondrial toxins are air pollution and cigarette smoking. Compared with its nuclear counterpart, mitochondrial DNA generally has less capacity to repair itself. It specifically can't delete the large DNA helix–distorting adducts formed when mitochondrial DNA bases are damaged by mutagens such as polyaromatic hydrocarbons and ultraviolet radiation.
Conclusion - Despite numerous existing researches, the specified question requires further study. it is necessary clearer understanding of what specific environmental factors damage mitochondria and how they do so, this is important way to prevent many diseases induced by mitochondrial dysfunction.
Keywords: Mitochondria; Environmental Factors; Mitochondrial dysfunction;

Mitochondria—tiny organelles in the cell that each possess their own DNA—have come under a growing scientific spotlight. [1]The traditional view of mitochondria as static organelles has been reassessed [2] Growing literature indicates that mitochondria which are central hubs of metabolic and cell signaling and are responsible for a large variety of biochemical processes, including oxidative stress, metabolite production, energy transduction, hormone synthesis, and apoptosis, [3] are targeted by environmental pollutants [4] resulting in multi system disorders involving different cells, tissues, and organs. [2] Now scientists are linking environmental interactions with the mitochondria to an array of metabolic and age-related maladies, including cancer, autism, type 2 diabetes, Alzheimer disease, Parkinson disease, and cardiovascular illness. [1]

The purpose of this review is to discuss the mechanism and consequences of mitochondrial dysfunction caused by environmental factors.

As a central hub of all these mechanistic endpoints, a growing amount of data provided by academic scientific literature points to mitochondria as a key organelle targeted by environmental pollutants[5] that are known to contribute to common human diseases [6]. Due to their susceptibility to damage, mitochondria are highly sensitive to environmental toxicants. The charged difference between the mitochondrial matrix and the cytosol allows for positively charged and lipophilic chemicals to accumulate within the mitochondrial matrix[7;8] The damage caused by chemicals within the mitochondria can manifest in multiple ways, [9] for example mitochondrial hyperfission, release of cytochrome *c* and subsequently activation of caspases and apoptosis [10]]. The different types of damage interact to exacerbate detrimental effects and can result in cell death. [9] Other types of damage can include dysregulation of Ca^{2+}, changes in membrane permeability, and structural damage to the mitochondria [11;12 Often, the damage leads to the disruption of the mitochondrial electron transport chain (ETC), which results in excess generation of ROS, and decreased ATP levels [13;14] Moreover, the presence of excess ROS within the mitochondria can induce a positive feedback loop in the mitochondrial environment, leading to more ROS release[15;16] ROS have been identified as signaling molecules that promote crosstalks between mitochondria and other organelles. A low level of ROS promotes lifespan such as caloric restriction, exercise and intermittent fasting by triggering adaptative response (mitohormesis) [17], whereas increased levels of ROS induced by mitochondrial dysfunctions are involved in aging process and multiple disease development [18].

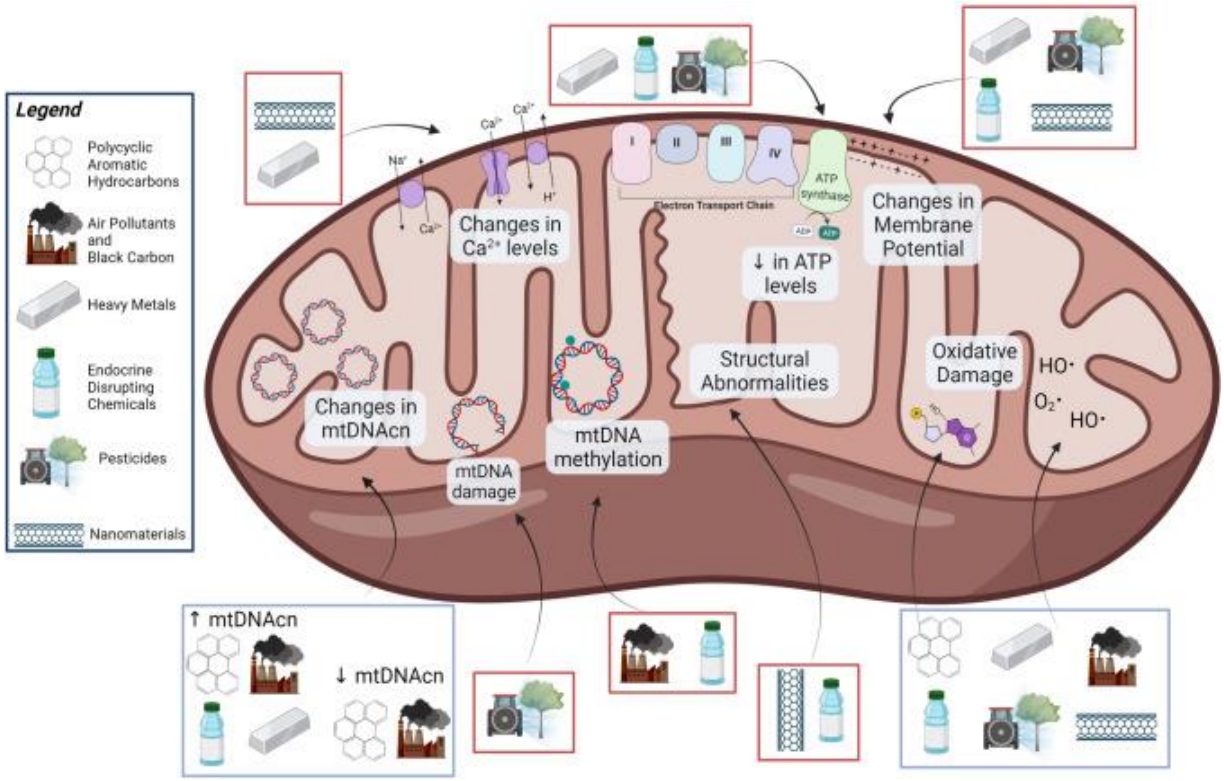
Figure 1; [27]



ROS can cause lipid oxidation and generate aldehydes, and phospholipid aldehydes [19] Aldehydes can form adducts with reactive residues on proteins or small molecules, and these chemical modifications can alter and/or interfere with normal biologic processes, such as signal transduction, and/or be directly toxic to the cell [20].

Environmental pollutants may cause damage at the molecular level in the cell, which can disrupt cellular function. The most widely studied impact of environmental exposures is that of DNA damage. [6] [Recognition of the key role of mtDNA integrity and mitochondrial function in health has grown greatly in recent years. [4] One such mechanism for this is through environmental factors increasing oxidative stress in the cell, and this stress can subsequently lead to alterations in DNA molecules. [21] In particular, mtDNA is susceptible to ROS-induced damage, due to its close proximity to the ETC, a lack of histones and few available DNA repair pathways [22] (Fig-2) [7]

Changes in mitochondrial morphology caused by different insults (*e.g.*, hypercaloric diets, alcohol or toxicants), are mediated, at least in part, by mitochondrial remodeling, including elongation or overall enlargement of the mitochondria [23;24], by fusion of mitochondria (*i.e.*, mitochondrial hypertrophy), or by mitochondrial swelling [25;26]. Mitochondrial hypertrophy is associated with normal cristae, normal matrix density and normal oxidative phosphorylation, whereas mitochondrial swelling is associated with swollen cristae, irregular matrix density and uncoupled oxidative phosphorylation. These morphological differences thereby impact overall mitochondrial function and efficiency. [2].



Exposure to multiple environmental contaminants throughout life has a significant impact on health, at various degrees depending on the period of life to which one is exposed, the chronicity and the doses of exposure. [3]

depending upon the concentration of the toxins and duration of their exposure, clinical manifestation will vary; for example, acute presentation may occur on exposure to a high

concentration of toxin for a short duration and chronic presentation may occur with prolonged exposure to low concentration of toxin.[27]
also is important age. In particular Extremes of ages are more severely affected by environmental toxins. Their entry through the placenta in utero or through breast milk post-natally has bad effects on the neurodevelopment of the child as these toxins, even in low concentrations, can cross the BBB to affect the developing brain. Poor hepatic and renal functions and age-related neurodegeneration make the elderly population more vulnerable to the ill-effects of environmental pollutants. [18] Should be considered that Individuals have different susceptibilities to these environmental exposures; a part of the general population may be protected from their effects, or only develop mild symptoms, while a variable proportion may go on to present severe disease phenotypes. It is also noteworthy that contaminants display various mechanisms of toxicity. They can sustainably modify gene expression, disrupt metabolic homeostasis, induce oxidative stress, lead to endocrine signaling dysfunction, or perturb epigenetic marks. [3]

Conclusion

According to numerous studiesmitochondrial dysfunction appears to have a central role in the triggering and the progression of numerous human diseases, highlighting a strong susceptibility of mitochondria to environmental pollutants**.** Despite numerous existing researches, the specified question requires further study. it is necessary clearer understanding of what specific environmental factors damage mitochondria and how they do so, this is important way to prevent many diseases induced by mitochondrial dysfunction.

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CONTRIBUTIONS OF CAREGIVERS IN FOSTERING PSYCHOLOGICAL WELL-BEING AMONG ELDERLY INDIVIDUALS

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ABSTRACT

This research article investigates the essential role of care support workers in elevating the psychological well-being of elderly individuals, addressing the escalating demand for effective eldercare in the context of a rapidly aging global population. Through an in-depth exploration, the study unveils a spectrum of contributions and strategic interventions employed by care support workers to foster and sustain the psychological health of elderly individuals. By synthesizing a comprehensive review of existing literature with empirical evidence, the research offers nuanced insights into the multifaceted dimensions of this critical facet of eldercare, contributing to a deeper understanding of the challenges and opportunities in promoting mental well-being among the aging population.
Keywords: Caregivers Support, Elderly Well-being, Home care support.

Introduction

The agingpopulation presents a pressing challenge for societies worldwide, necessitating a deeper understanding of the factors influencing the psychological well-being of elderly individuals. This research aims to investigate how care support workers, often on the front lines of eldercare, play a significant role in fostering and maintaining psychological well-being in their elderly charges [1. Smith, J., & Brown, A., 2023].

Literature Review

A thorough examination of existing literature will be conducted to provide a comprehensive overview of the psychological challenges faced by the elderly and the impact of caregiving on their mental health. Previous studies exploring the role of care support workers in eldercare will be critically reviewed, highlighting gaps in knowledge that this research seeks to address.

Informal caregivers play a crucial role in providing care and support to the elderly, contributing significantly to their well-being and quality of life. Informal caregivers are typically family members, friends, or neighbours who provide unpaid assistance and care to older individuals. Informal caregivers often assist with the activities of daily living (ADLs), including bathing, dressing, grooming, and mobility [2. Johnson, C., & Williams, 2023]. This personal care helps older individuals maintain their dignity and independence. Informal caregivers offer emotional support and companionship, helping to alleviate feelings of loneliness and isolation commonly experienced by the elderly [12. Scandurra, C., et al., 2023]. The companionship and connection fostered by caregivers contribute to the overall emotional well-being of older individuals. Caregivers serve as advocates for the elderly, ensuring they receive appropriate healthcare services and coordinating medical appointments. They may also help manage medications and monitor health conditions. Informal caregivers often take on responsibilities related to household

tasks, such as cooking, cleaning, grocery shopping, and managing finances. These tasks contribute to creating a safe and comfortable living environment for the elderly.

Caregivers play a crucial role in facilitating social engagement for the elderly. They may arrange visits with friends and family, accompany them to social events, or encourage participation in community activities. During emergencies or health crises, informal caregivers are often the first responders [3. Davis, R., et al., 2022]. Their ability to manage crises effectively, including seeking medical help when needed, is vital for the well-being of the elderly. Informal caregivers engage older individuals in activities that stimulate cognitive function, such as playing games, reading, or engaging in conversations [11. Bieszk-Stolorz, et al., 2023]. This helps maintain cognitive abilities and prevents social isolation. Caregivers often provide respite care for family members, giving primary caregivers the opportunity to take a break and attend to their own needs. This respite is essential for preventing caregiver burnout. Caregivers advocate for the rights and preferences of the elderly, ensuring that their choices and desires are respected [4. White, et al., 2022]. This includes participating in decisions related to healthcare, living arrangements, and overall quality of life. During the end-of-life stage, caregivers provide comfort, emotional support, and necessary care to ensure the elderly experience dignity and compassion in their final moments.

The contributions of informal caregivers are invaluable in supporting the elderly to age in place and maintain a high quality of life. Recognizing and supporting the well-being of informal caregivers is essential for sustaining their ability to provide quality care over time. This often involves providing education, resources, and respite care to help caregivers navigate the challenges associated with their caregiving roles [5. Brown, et al., 2023].

Methodology

This study employs a mixed method approach, combining qualitative interviews with care support workers, quantitative surveys assessing the psychological well-being of elderly individuals under their care, and a review of relevant case studies. The triangulation of these methods aims to provide a holistic understanding of the contributions made by care support workers [10. Feng, et al., 2023].

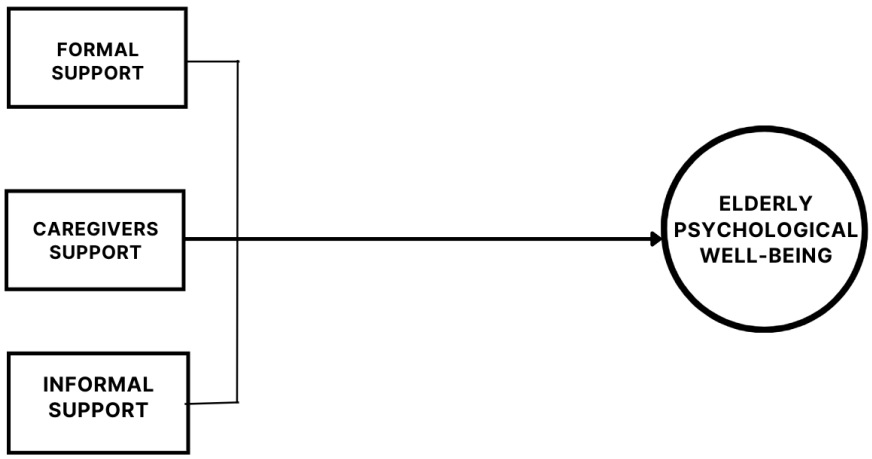

Figure 1. Conceptual Framework for the research.

Case Study 1. The Power of Companionship.
Mrs. Thompson, an 80-year-old widow, was living alone and experiencing feelings of loneliness and isolation (13. Kang, H., et al., 2022).. A care support worker, Emily, was assigned to provide companionship and assistance with daily activities.

Contribution
Emily recognized the importance of emotional support and engaged Mrs. Thompson in meaningful conversations, shared hobbies, and outings. By fostering a genuine connection, Emily significantly improved Mrs. Thompson's mood and reduced feelings of isolation. Through consistent companionship, Mrs. Thompson developed a sense of belonging and reported increased life satisfaction (14. Sapranaviciute-Zabazlajeva, et al., 2022).

Figure 2. Caregivers support to the Elderly Individuals. **Sources:** Family Resource Home Care.

Case Study 2. Cognitive Stimulation for Mental Agility.
Mr. Patel, a 75-year-old retired professor, was showing signs of cognitive decline and boredom. His care support worker, Maria, designed a personalized plan to stimulate his cognitive abilities and provide mental challenges.

Contribution:
Maria introduced various activities such as puzzles, memory games, and discussions on academic topics related to Mr. Patel's interests. Over time, his cognitive function improved, and he expressed a renewed sense of purpose. Maria's tailored approach showcased the positive impact of cognitive stimulation on psychological well-being among the elderly.

Case Study 3. Creating a Supportive Environment.

John, an 85-year-old veteran, faced difficulties adjusting to assisted living due to his past trauma. Sarah, his care support worker, recognized the need for a supportive and understanding approach to address his psychological well-being.

Contribution

Sarah worked closely with the facility's staff to create a personalized care plan that considered John's unique needs and experiences. Through consistent emotional support, trust-building exercises, and involvement in veteran support groups, John's sense of security and well-being improved. The case demonstrated the importance of tailoring care to individual backgrounds and experiences.

These case studies exemplify the diverse ways care support workers contribute to the psychological well-being of elderly individuals, showcasing the significance of personalized care, companionship, and cognitive stimulation in enhancing their overall mental health.

Findings

Psychological well-being of elderly individuals

Depression and Anxiety

Older adults may be at an increased risk of depression and anxiety, often linked to factors such as social isolation, health problems, or the loss of friends and family members.

Coping Mechanisms

Developing effective coping mechanisms and support systems is crucial for maintaining mental health in later years.

Loneliness

Social isolation and loneliness can have significant impacts on psychological well-being. Maintaining social connections through family, friends, and community involvement is vital for emotional health.

Community Engagement

Involvement in community activities, clubs, and social groups can provide a sense of purpose and belonging (8. Zhang, Y., et al., 2022).

Cognitive Decline: While some cognitive decline is a normal part of aging, maintaining cognitive stimulation through activities such as puzzles, reading, and learning new skills can support cognitive function.

Dementia and Alzheimer's: Addressing and managing conditions like dementia and Alzheimer's disease is crucial. Early diagnosis and appropriate care can positively impact psychological well-being.

Life Satisfaction:
Adaptation to Change: The ability to adapt to life changes, such as retirement or changes in health, contributes to overall life satisfaction.
Reflection on Accomplishments: Reflecting on a lifetime of experiences, achievements, and relationships can foster a sense of fulfilment.

Connection Between Physical and Mental Health: Physical health and psychological well-being are interconnected. Regular exercise, a balanced diet, and adequate sleep contribute to both physical and mental health.

Chronic Health Conditions: Managing chronic health conditions is essential for preventing the negative impact of physical ailments on mental well-being.

Quality of Life:
Living Environment: A safe and comfortable living environment is crucial for the psychological well-being of the elderly.
Access to Healthcare: Adequate access to healthcare services, including mental health resources, is vital for addressing and managing psychological concerns.

Spiritual Well-Being:
Meaning and Purpose: Exploring and nurturing spiritual or existential aspects of life, such as finding meaning and purpose, can positively impact psychological well-being.
Overall, promoting the psychological well-being of the elderly involves a holistic approach that addresses mental, emotional, social, and physical aspects of their lives. Supportive communities, healthcare services, and family involvement play essential roles in fostering a positive and fulfilling aging experience.

Discussion
The psychological well-being of the elderly is a multifaceted aspect of aging that encompasses emotional, cognitive, and social dimensions. Social isolation and loneliness are prevalent concerns, emphasizing the importance of maintaining meaningful connections through family, friends, and community engagement. Mental health challenges, including depression and anxiety, may arise due to factors such as chronic health conditions and life transitions. Early detection and mental health support play a vital role in addressing these issues (7. Kang, H., et al., 2022). Cognitive well-being is integral, with cognitive stimulation and social engagement contributing to a fulfilling later life. Life satisfaction is influenced by factors such as a sense of purpose and meaningful connections.
Resilience and effective coping mechanisms are crucial for navigating the challenges associated with aging, including adapting to life changes and losses. Physical health is interconnected with psychological well-being, emphasizing the importance of regular exercise, a balanced diet, and proper healthcare. Exploring spiritual or existential aspects of life contributes to a sense of fulfilment. Finally, creating a supportive living environment that is safe and accessible promotes psychological well-being by providing a sense of security and comfort for the elderly. In conclusion, addressing mental health, social connections, cognitive function, and the overall quality of life is essential for fostering the psychological well-being of the elderly.

Contributions of Care Support Workers

Caregivers play an indispensable role in supporting the well-being of the elderly by providing essential care, emotional support, and companionship. These dedicated individuals, often family members or friends, contribute significantly to maintaining the independence and dignity of older adults. Caregivers assist with daily activities, manage healthcare needs, and create a supportive environment, fostering a sense of security for the elderly. Their commitment extends to addressing challenges associated with aging, promoting social engagement, and ensuring a higher quality of life (15. Hossen MS & Pauzi HBM, 2023). The contributions of caregivers are invaluable, allowing older individuals to age with grace and comfort while experiencing a fulfilling and dignified later life.

Challenges and Opportunities

Recognizing the challenges faced by care support workers in their efforts to enhance psychological well-being, this section will also explore potential opportunities for improvement. Addressing issues such as caregiver burnout, training programs, and technological innovations will be discussed as avenues for enhancing the overall effectiveness of eldercare.

Conclusion

The article will conclude by summarizing key findings and emphasizing the crucial role that care support workers play in fostering the psychological well-being of elderly individuals. Suggestions for future research directions will be proposed to further advance our understanding of this critical aspect of eldercare.

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Declarations

The manuscript has not been submitted to any other journal or conference.

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ENDOTHELIAL GLYCOCALYX DAMAGE IN PATIENTS WITH SEVERE FUNCTIONAL INJURY

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Introduction

In modern medical science, endothelial glycocalyx, which is considered a target organ in many diseases, including severe traumatic injuries, is becoming one of the main objects of researchers' attention [1,2]. Trauma is the leading cause of death and disability worldwide, and despite the introduction of damage-controlled resuscitation, mortality remains very high. More than half of trauma patients are found to have laboratory-defined coagulopathy on admission, which further leads to increased mortality [3,4]. Laboratory-defined coagulopathy, also called trauma-induced coagulopathy, is described as either excessive activation of the protein C pathway accompanied by hyperfibrinolysis or as a manifestation of the hemorrhagic phenotype of disseminated intravascular coagulation. Common to both of these explanations is that, they are based on the measurement of concentrations of pro- and anticoagulant clotting factors, platelet counts, and fibrin degradation products [5,6].

Nowadays, evidence is accumulating for a key role of the glycocalyx as one of the first structures involved in the trauma-induced coagulopathic response and it may be one of the earliest signs of progression in the severity of patients. In our study of trauma patients using whole blood thrombelastography (TEG), we found that the hemostatic profile became increasingly hypocoagulative and hyperfibrinolytic with increasing severity of injury,

Therefore, studies of the significance of glycocalyx in the development of severe complications in conditions of persistently high lethality in trauma patients [7,8], are a priority and primary task of science and practical health care.

Glycocalyx is a birth of a new clinical paradigm, but the full understanding of its significance and functions is still far away and researchers are only at the beginning of the way.

We study the role of the endothelial glycocalyx system and analyze the relationship between markers of glycocalyx degradation and the severity of the clinical course of the disease in severe traumatic injuries.

It is expected that a deeper study of the glycocalyx, understanding the relationship between the mechanisms of its degradation and trauma is extremely important and will lead to the development of new scientific strategies for early diagnosis and the possibility of predicting disease outcomes in patients with severe traumatic injuries.

The object of our scientific research were patients with severe combined trauma. The study was carried out taking into account the principles of evidence-based medicine. The obtained data were processed using standard methods of statistical analysis.

Materials and research methods

The studied patients were aged from 19 to 78 years; thus the mean age was 47 ± 9.1 years. Among them 37 (62.7%) were males and 23 (38.3%) were females. The age distribution by sex and age is presented in Table 1.

Table 1. Distribution of patients by sex and age (n=60).

Age, years	Males (%)	Females (%)
19 - 30	9 (15,0%)	4 (6,6%)
31 - 40	7 (11,6%)	4 (6,6%)
41 – 50	11 (18,3%)	7 (11,6%)
51 – 60	4 (6,6%)	4 (6,6%)
61 – 68	4 (6,6%)	3 (5,6%)
69-78	2 (3,3%)	1 (1,6%)
Total (100%)	37 (61,4%)	23 (38,6%)

The cause of severe combined trauma was road traffic accidents in 41 cases (68.3%), various other traumas, including stabbings and falls, in 12 cases (20.1%), and industrial trauma in 7 cases (11.6%).

Thromboelastographic study of whole citrate blood was performed at three different stages - on the 1st, 3rd and 7th day from the patient's admission to the intensive care unit.

After sampling citrate blood into standard tubes with preservative in the form of sodium citrate, tests were performed within 30 min from the moment of collection. TEG was performed on a Haemoscope 5000 thromboelastograph. Platelet-depleted plasma was obtained by double centrifugation of the sample for 8 min at 1000 rpm, platelet-depleted plasma was obtained from platelet-rich plasma by centrifugation for 15 min at 5000 rpm). Recalcification of samples (340 µl of citrate blood or 330 µl of platelet-depleted plasma) was performed by adding 0.2 M calcium chloride solution to the sample (20 µl for citrate blood and 30 µl for platelet-depleted plasma).

TEG indices were studied: LY30 - clot lysis 30 min after reaching the maximum TEG amplitude; LY60 - clot lysis 60 min after reaching the maximum TEG amplitude; CL30 - blood lysis index 30 min - percentage of TEG amplitude 30 min after the start of the study of the maximum TEG amplitude. The obtained TEG indices were compared with reference values.

Results and discussion

During the study of fibrinolytic activity of whole blood samples in victims with severe combined traumas the increase of LY30, LY60 levels and decrease of CL30 and CL60 indices were determined. These data are presented in Table 2.

Analysis of the obtained data determined reliable differences of LY60 and LY30 indices at admission and on the 3rd day of a severe patient's stay in the intensive care unit ($p < 0.05$). On the 3rd and 3rd day the increased fibrinolytic activity in blood samples was still preserved. A significant increase in CL60 on the 3rd day from the moment of admission compared to the initial

data obtained on admission ($p < 0.05$) was also revealed. These highly sensitive parameters are indicators of hemostasis.

Table 2. TEG indicators in patients with severe combined injuries (M±m).

TEG indicators, %	1-st day admission in the ICU	3-rd day in the ICU	7-th day in the ICU
LY60	18,8±6,2	42,6±16,0	46,1±11,9
LY30	23,7±9,5	32,1±12,0	27,3±9,7**
CL60	33,9±8,9	35,7±9,3*	33,0±6,8
CL30	44,2±13,8	41,8±18,9*	27,0±4,1
*The difference is reliable compared to the index obtained at admission ($p < 0.05$)			
**The difference is reliable compared to the index obtained on the 3rd day after admission ($p < 0.05$)			

Furthermore, we discovered in a study of the hemostasis system by whole blood thrombelastography in patients with severe trauma that the hemostatic profile changed mainly toward hypocoagulation with increasing severity of injury. To fully understand these results, we hypothesized that the endothelium must also be included as a key part of the vascular compartment and the hemostatic changes observed in whole blood represent an evolutionarily adapted response to a potentially life-threatening condition. Also, it is known from the literature that traumatic and hemorrhagic shocks are associated with destruction of the endothelial glycocalyx system [7]. As noted by Drost CC.et al, 2021 and Cao RN.et al, 2019, changes in glycocalyx composition are one of the earliest signs of deterioration and mortality in patients. However, the mechanisms of these disorders remain not fully understood until recently [8-10].
The obtained data reflect that the decrease in TEG amplitude observed in the course of the study was due to the processes of fibrinolysis developed in the acute periods after severe combined trauma and accompanied by shock. Activation of hyperfibrinolysis processes was more expressed in patients with the most severe combined traumatic injuries. This group of patients showed the unfavorable outcome of the disease. The destruction of glycocalyx caused by inflammation, hypocoagulation can be responsible for a number of specific functional injuries, such as acute kidney damage, respiratory and hepatic failure, which we observed in our patients.

Conclusion

1. Thromboelastogram with cellular model of blood coagulation allows timely diagnosis of trauma-associated coagulopathy.
2. Based on the obtained data, it can be stated that in the evaluation of TEG results, the decrease in amplitude is due to the activation of fibrinolytic processes in the hemostasis system in patients with severe combined traumas.
3. The revealed traumatic coagulopathy may reflect the damage of endothelial glycocalyx in patients with severe functional injuries in traumas.

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DOI PREFIX: 10.36962/ALISJMSC
Ambiance in Life-International Scientific Journal in Medicine of Southern Caucasus.
http://scsj.fisdd.org/index.php/ail

Representation of the International Diaspora Center of Azerbaijan in Georgia. NGO (Georgia Tbilisi) is publishing scientific papers of scientists on Website and in Referred Journals with subjects which are mentioned below:

ISSN: 2298-0946, E-ISSN: 1987-6114; UDC: 3/k-144
DOI PREFIX: 10.36962/CESAJSC
The Caucasus-Economic and Social Analysis Journal of Southern Caucasus
http://scsj.fisdd.org/index.php/CESAJSC

ISSN: 2733-2713, E-ISSN: 2733-2721
VOLUME 12 ISSUE 02 2023
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Title of the Paper (14 point, Bold, Times New Roman)

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ABSTRACT
(Times New Roman, 12)
The manuscript should contain an abstract within 300 words. The manuscript should have a self-contained, citation-free abstract and state briefly the purpose of the research, methodology, key results and major conclusions. Abstract should be in a single paragraph with running sentences. Do not use any subheading or point list within the abstract. Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.
Keywords: Authors are advised to writes 3-5 keywords related to the article, separated by comma. These keywords will be used for indexing purpose.

Introduction (Times New Roman, 12)

Mostly Papers starts with introduction. It contains the brief idea of work, requirement for this research work, problem statement, and Authors contribution towards their research. Sufficient recent reference citation [1] from last 2 years should be included for showing the existing challenges and importance of current work. This section should be succinct, with no subheadings unless unavoidable [2, 3]. State the objectives of the work and provide an adequate background related to your work, avoiding a detailed literature survey or a summary of the results.

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This part should contain sufficient detail to reproduce reported data. It can be divided into subsections if several methods are described. Methods already published should be indicated by a reference [4], only relevant modifications should be described. Methodology should be written concisely in detail by maintaining continuity of the texts.

Theory and Calculation (Times New Roman, 12)

A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis. Do not add extensive basic definitions or well-known theories, instead highlight theoretical background and its specific usages in view of your work only.

Mathematical Expressions and Symbols (Times New Roman, 12)

Mathematical expressions and symbols should be inserted using **equation tool** of Microsoft word. References may be added for used equations to support its authenticity, e.g. this result has been analysed using Fourier series [5].

$$f(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right) \quad (1)$$

Results and Discussion (Times New Roman, 12)

This section may each be divided by subheadings or may be combined. A combined Results and Discussion section is often appropriate. This should explore the significance of the results of the work, don't repeat them. Avoid extensive citations and discussion of published literature only, instead discuss recent literature for comparing your work to highlight novelty of the work in view of recent development and challenges in the field.

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Authors are supposed to embed all figures and tables at appropriate place within manuscript. Figures and tables should neither be submitted in separate files nor add at the end of manuscript. Figures and Tables should be numbered properly with descriptive title. Each Figure/Table must be explained within the text by referring to corresponding figure/table number. Any unexplained or unnumbered Figure/Table may cause rejection of the paper without being reviewed.

Formatting Tables (Times New Roman, 12)

Table should be prepare using table tool within the Microsoft word and cited consecutively in the text. Every table must have a descriptive title and if numerical measurements are given, the units should be included in the column heading. Formatting requirement has been summarized in the Table 1.

Table 1: Summary of formatting requirement for submitting paper in this journal.
(Times New Roman, 12)

Layout	**Size**	**Margin (Normal)**	Header	Footer	
Single column	A4 (8.27" X 11.69")	Top=1" Bottom=1" Left=1" Right=1"	Do not add anything in the header	So not add anything in the footer	
Font	**Article Title**	**Headings**	**Subheadings**	**Reference list**	**Text**
	Times New Roman, 16 pt, Bold, centred	Times New Roman, 11 pt, Bold, Left aligned	Times New Roman, 10 pt, Bold, Left aligned	Times New Roman, 8 pt, Justified	Garamond, 11 pt, Justified
Line Spacing	1.15	1.15	1.15	1.15	1.15
Page number	We will format and assign page numbers				

(Times New Roman, 10)

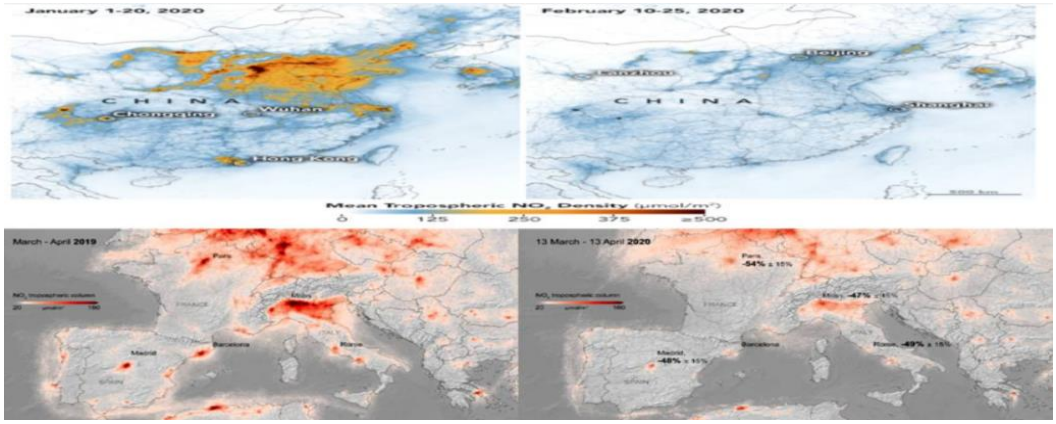

Figure 1: Logo of the IRETC Publisher (Times New Roman, 12)

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All figures should be cited in the paper in a consecutive order, author may be asked to provide separate files of the figure. Figures should be used in bitmap formats (TIFF, GIF, JPEG, etc.) with 300 dpi resolution at least unless the resolution is intentionally set to a lower level for scientific reasons. If a bitmap image has labels, the image and labels should be embedded in separate layer. Figure 1 shows the logo of AIJR Publisher.

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Each manuscript should contain a conclusion section within 250-450 words which may contain the major outcome of the work, highlighting its importance, limitation, relevance, application and recommendation. Conclusion should be written in continuous manner with running sentences which normally includes main outcome of the research work, its application, limitation and recommendation. Do not use any subheading, citation, references to other part of the manuscript, or point list within the conclusion.

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Provide all possible limitation faced in the study which might significantly affect research outcome, If not applicable write, none.

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Author(s) are responsible for ensuring that the information in each reference is complete and accurate. **Do not use grey literature (unauthentic website, news portal, social media, Wikipedia etc) as reference, only scholarly literature (Journal, online books, proceedings, patents, authentic websites with permanent archival policy) are acceptable references.** Author should include sufficient recent (last 2 years) references in the article. All references must be numbered consecutively and citations of references in the text should be identified using numbers in square brackets (e.g., “as explained by AIJR [1]”; “as discussed in many reports [2]-[6]”). All references should be cited within the text correctly; do not add only list of references without citation within the text. All cited references should be listed after declarations section in the following style-

1. W. S. Author, “Title of paper,” Name of Journal in italic, vol. x, no. x, pp. xxx-xxx, Abbrev. Month, year. https://doi.org/10.21467/ajgr
2. Bahishti, “Peer Review; Critical Process of a Scholarly Publication”, J. Mod. Mater., vol. 2, no. 1, pp. 1.1-1.2, Oct. 2016. https://doi.org/10.21467/jmm.2.1.1.1-1.2
3. Bahishti, “A New Multidisciplinary Journal; International Annals of Science”, Int. Ann. Sci., vol. 1, no. 1, pp. 1.1-1.2, Feb. 2017. https://journals.aijr.in/index.php/ias/article/view/163
4. W. S. Author, “Title of paper,” Name of Journal in italic, vol. x, no. x, pp. xxx-xxx, Abbrev. Month, year. Access online on 20 March 2018 at https://www.aijr.in/journal-list/advanced-journal-graduate-research/
5. W. S. Author, “Title of paper,” Name of Journal in italic, vol. x, no. x, pp. xxx-xxx, Abbrev. Month, year. Access online on 5 March 2018 at https://www.aijr.in/about/publication-ethics/
6. M. Ahmad, “Importance of Modeling and Simulation of Materials in Research”, J. Mod. Sim. Mater., vol. 1, no. 1, pp. 1-2, Jan. 2018. DOI: https://doi.org/10.21467/jmsm.1.1.1-2

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