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Section 1
Clinical cases

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CHARACTERISTICS AND RESULTS OF A SURGICAL TREATMENT OF PATIENTS WITH A HYPERTROPHIC CARDIOMYOPATHY

Hypertrophic cardiomyopathy (HCM) is diagnosed in a presence of severe hypertrophy of the walls of the left ventricle (LV) with a predominant remodeling of n the interventricular septum and the posterior LV wall, when the LV outflow tract (LVOT) begins to obstruct outflow hemodynamics. Because of an extreme genetic etiology diversity of the pathology, the genes that cause it e remain unknown in about 40% of patients with HCM. With the development of NGS technologies, the work of identifying of new mutations has become slightly easier. In addition to rare pathogenic variants of the sarcomeric protein gene, relatively common genetic variants associated with HCM are increasingly being recognized. We performed an examination of 43 patients at the RIOC and ID JSC from January 2017 to August 2021 were examined, 21 of whom had severe HCM with LVOT obstruction that required surgical treatment. Pathology in female population occurred in 67% of cases, in men it was 2 times less – 33 22 patients (51%) had an obstructive form of HCM. The other 21 patients have initial signs of HCM (are under observation) and 35% were asymptomatic patients.

IT was established that 56% of the cohort had different types of mutations, in which it was found that 75% of patients had monomutations, and 25% had 2 mutations. In most cases, mutations were found in the myosin heavy chain (MYH7 – 42%) and myosin-binding protein C (MYBPC3 – 17%). In the group ofpatients that underwent a surgical treatment, 12 patients (57%) of patients had various mutations. Also, in 4 patients, we tracked the family history. Morrow myectomy was performed in 21 patients, 95% of them additionally underwent mitral valve repair with removal of secondary chords. In all operated patients, the pressure gradient on the LVOT decreased from 2 to 7+ 1.7 mm Hg. There were no lethal outcomes.

Key words: gene, mutations, patient characteristics, hypertrophic cardiomyopathy, Morrow myectomy

Introduction

Hypertrophic cardiomyopathy (HCM) is a heart condition, with left ventricular wall hypertrophy (LVH), characterized by disordered location of myocytes, as well as cardiac fibrosis [1]. According to world statistics, the prevalence of HCM is 1 in 500 among the adult population [2]. Generally, HCM is inherited as an autosomal dominant trait that causes variants of mutations in genes characteristic of the sarcomere. Although HCM is considered to be predominantly a monogenic disease, there are a growing number of theories that explain phenotypic diversity, such as alteration of gene variants, epigenetics and other regulatory mechanisms of gene expression, and environmental factors. Despite recent advances in genetic technology, it is impossible to definitively establish a causal relationship between some cases, especially in sporadic cases or in small families. Due to the extreme genetic diversity, the genes that cause the disease remain unknown in approximately 40% of patients with HCM [3]. With the development of NGS technologies, the work of searching for new mutations has become slightly easier. In addition to rare pathogenic variants of the sarcomeric protein gene, relatively common

variants associated with HCM are increasingly being recognized [4,5]. Exercise, diet, cardiac stress conditions, environmental exposure, and other diseases are non-genetic factors that alter expanding HCM variants. However, the underlying mechanisms have not yet been accurately described.

The clinical manifestations of HCM are very diverse. Individuals with HCM may present with a constellation of symptoms, including dyspnea on exertion, fatigue, palpitations, dizziness, syncope, atypical chest pain, and sudden cardiac death (SCD) resulting in diastolic ventricular dysfunction, cardiac arrhythmias, and LVOT obstruction as the underlying pathophysiological conditions [6,7]. The signs and symptoms of HCM do not necessarily correlate with the degree or severity of LVOT obstruction or the degree of LVH, and a significant proportion of young patients with HCM remain asymptomatic or minimally symptomatic throughout life [8]. HCM is the most common cause of sudden cardiac death in young people and often athletes, which is the most formidable complication that can occur as the first manifestation of the disease [9,10]. The catalysts that provoke acute life-threatening arrhythmia or sudden cardiac death (SCD) remain poorly understood, but it is important to consider anatomical obstruction and electrophysiological abnormalities. The risk of SCD is based on a history of cardiac arrest or sustained ventricular tachycardia (VT), unexplained syncope, a family history of sudden death suspected of being caused by HCM in one or more first-degree relatives, and documentation of maximum LV wall thickness (≥30 mm), nonsustained VT, and abnormal blood pressure response during exercise [8]. The progression of heart failure (HF), a clinical syndrome of dyspnea on exertion in patients with HCM, is disproportionate or occurs in the absence of volume overload and pulmonary congestion seen in typical patients with HF. This may occur in intravascular volume depletion, filling disturbance (e.g., diastolic dysfunction), arrhythmia (e.g., tachyarrhythmia), or myocardial dysfunction secondary to ischemia (due to mismatch in oxygen demand) and small vessel coronary artery disease [7,11]. LVOT obstruction is a fundamental feature resulting from dynamic ventricular septal enlargement exacerbated by systolic anterior mitral valve movement, which can cause acute or intermittent symptoms of HF [7]. Arrhythmias, including atrial fibrillation (AF is a major factor in thromboembolic stroke [6] and ventricular tachycardia, may precede the development of heart failure (HF) or complicate HF in HCM.

Materials and Methods

We examined 43 patients at the JSC RIOC and ID from January 2017 to August 2021, (Figure 1), 21 of whom had severe HCM with LVOT obstruction, which required surgical treatment – Morroy myectomy surgery. The age of patients ranged from 18 to 80 years, the average age was 57 years.

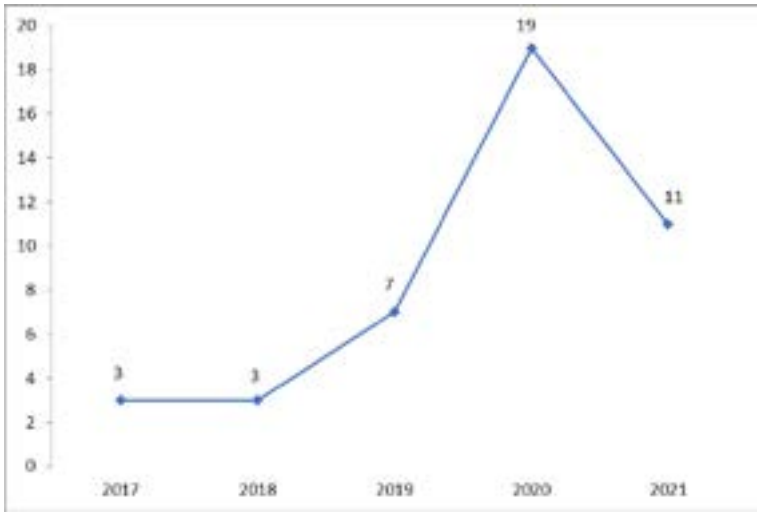

Figure 1 – Number of identified patients with HCM.

Interpreting the data, it was noted that since 2019 (2019 – 7 patients, 2020 – 19 patients) there has been an increase in diagnosed patients with HCM, which is due to the fact that the RIOC and ID database is the only source collecting the data with this pathology, patient negotiability (active training of cardiologists

in the city and regions), the presence of subspecialists in the functional diagnostic team who know this pathology.

The majority of the patients was referred from Almaty (42%) and Almaty region (47%), other regions (EKR, KZO, WKO) from 2 to 5%, which indicates that it is necessary to conduct seminars and training for general practitioners, cardiologists and patient community in remote regions of the Republic of Kazakhstan.

The research methods in our case in 100% of cases were the following: transthoracic echocardiography (ECHOCG) – as the gold standard, transesophageal EchoCG (TEECHOCG), electrocardiography (ECG), 24-hours Holter ECG. From laboratory research methods – NT-pro BNP (brain natriuretic hormone), for the diagnosis of heart failure. All operated patients underwent histological biopsy test (excised muscle folds). Next generation sequencing (NGS) is a method for determining the nucleotide sequence of DNA and RNA to obtain a description of its primary structure. The technology of the new generation sequencing method allows you to "read" several sections of the genome at once, which is the main difference from earlier sequencing methods. NGS is accomplished by repeated cycles of polymerase-induced chain extension or multiple ligation of oligonucleotides. During NGS, up to hundreds of megabases and gigabases of nucleotide sequences can be generated in one working cycle [6]. Genetic study (dry blood spot – spot) was sent to the DLE genetic laboratory, Brazil (MK Sanofi) and obtained results for possible mutations in 17 genes, as well as the exclusion of Fabry disease (the study went on for 1 year from 2020 to 2021).

Results and Discussion

In the Republic of Kazakhstan, as well as according to the world literature (Figure 2), in most cases, pathology occurs in women (67%), while in men it is 2 times less (33%). Ethnic origin, in 25 (58%) patients was recorded in Kazakhs, 14 (33%) cases in Russians and in 9% (4) in Uighurs.

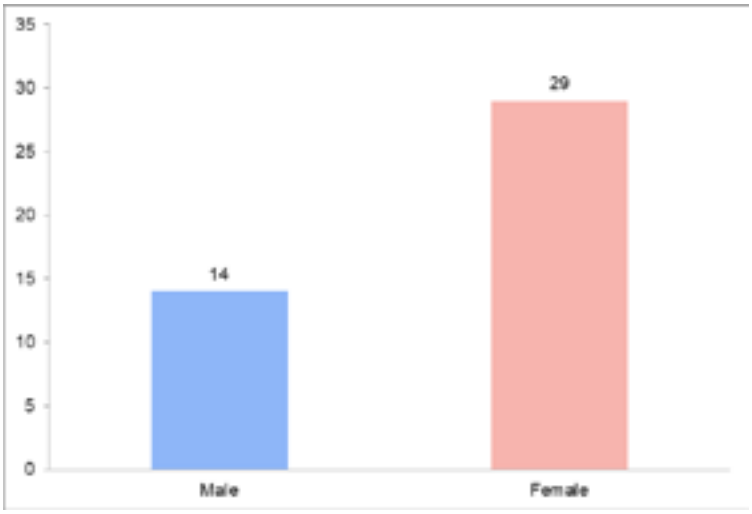

Figure 2 – Distribution by sex

In our study, 22 patients (51%) out of 43 had an obstructive form of HCM and were operated (21 patients) at the RIOC and ID, 1 patient was not operated because of frailty (80 years old and significant concomitant pathology (diabetes mellitus, acute renal failure)). The remaining 21 patients have had some initial signs of HCM (they are under observation, Transthoracic EchoCG is performed twice a year) Figure 3), other 35% were asymptomatic with echocardiographic lesions and positive genetics. 14% of patients have changes according to EchoCG, clinic (dyspnea, anginal pain), but did not have indications for surgical treatment at the time of the study. Periodic anginal pain was noted by 58% of patients, 6 patients described severe pain. Heart rhythm changes were not observed in 86% of patients according to the Holter ECG data, in 2 cases a pathology of the coronary bed was detected during coronary angiographythat required additional coronary bypass grafting. A concomitant pathology of the heart valves (mainly the mitral valve) was registered in after coronary angiography 49% of the patients.

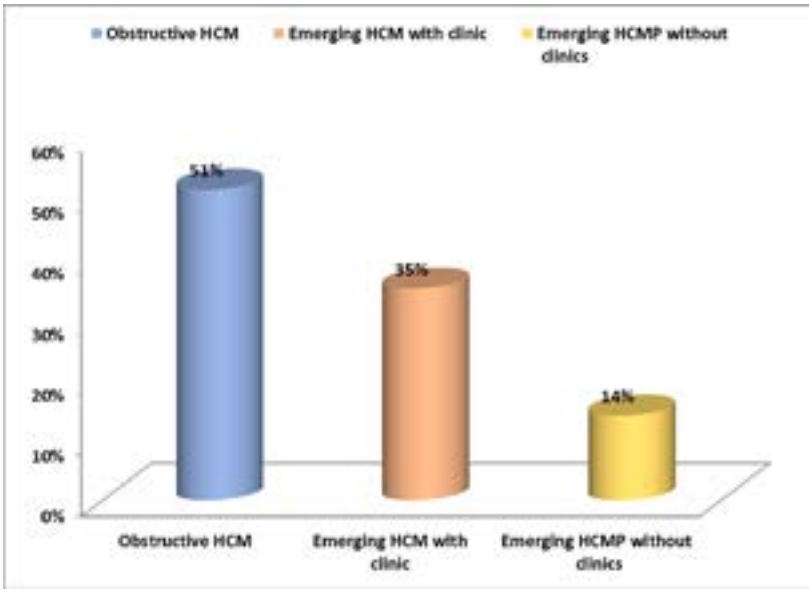

Figure 3 – Forms of HCM

The New York Heart Association Classification of the severity of chronic heart failure in 51% of patients had class III, 35% of patients had class II, and 14% of patients IV.

The main complaint was dyspnea of varying severity in 98% of patients, dizziness in 31 (72%) patients, of which syncope (semi-consciousness) was observed only in 5 (12%) patients. no complaints of dizziness in the remaining 12 (28%) patients. Of the concomitant pathology, type 2 diabetes mellitus was also detected in 4 patients (in 9% of cases). Concomitant arrhythmia at the time of the study was in 22 (49%) patients (Figure 4).

When analyzing the data (Figure 4) it was noted that among 22 (51%) cases, of sinus rhythm, in 3 (7%) an ICD device was implanted due to the risk of SCD, in total, arrhythmias occurred in 8 (19%) cases, 2% – incomplete block of the bundle of His branches, ventricular tachycardias were found in 2% of cases. In 19% of cases, ventricular extrasystoles.

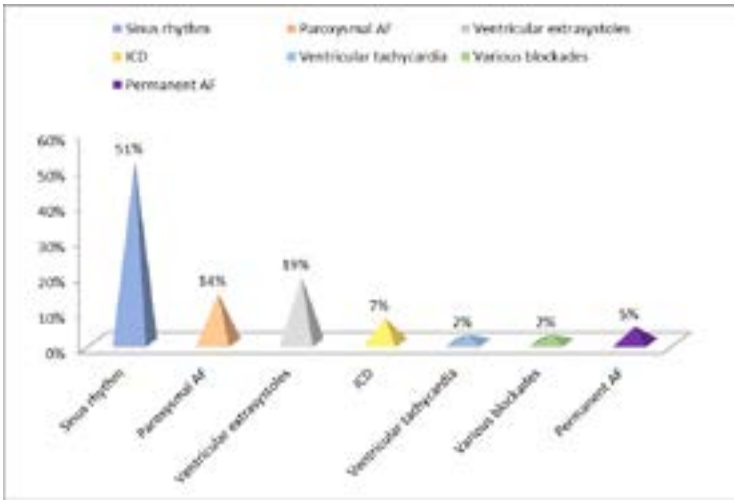

Figure 4 – Heart rhythms in patients with HCM according to the 24-hour Holter ECG and ECG data (Sinus rhythm, Paroxysmal atrial fibrillation, Ventricular extrasystoles, ICD – implantable cardioverter defibrillator, Ventricular tachycardias, Permanent form of atrial fibrillation).

The rhythm of the post-op patients (21) before discharge was: 18 (86%) sinus rhythm, 2 (10%) rhythm of the pacemaker, 1 (5%) had a permanent form of AF.

SAM syndrome was diagnosed among the 41 (95%) patients (mitral valve and 17 (40%) cases had damage to the valvular apparatus. According to the echocardiography, the maximum gradient on the LVOT at rest was 25 mmHg in post-op (21) patients, 85 mmHg after exercise, whilst in non-operated patients (23) the gradient was 15mmHgwith increase after a exercise to 47 mmHg.

Morrow myectomy was performed in 21 patients, 95% of them underwent additional mitral valve repair with removal of secondary chords, 10% (2 patients) had myocardial revascularization. In 100% of cases, all excised material was sent for histological test, according to which, hypertrophy and chaotic arrangement of cardiomyocytes, fibrosis were detected in 100% of cases.

Of the 43 patients who underwent a genetic study (Figure 5), 24 (56%) had various types of mutations, of which 18 (75%) patients (Figure 6) had monomutations, and 6 (25%) had 2 mutations.

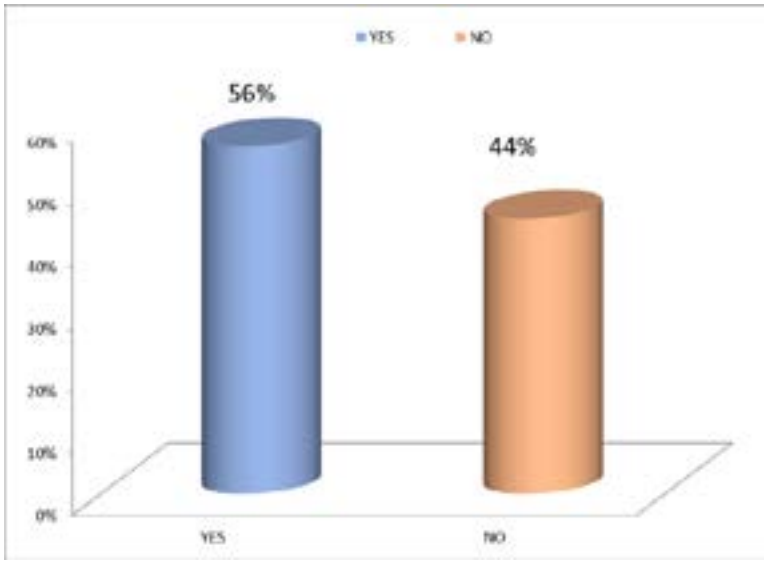

Figure 5 – The presence of identified genetic mutations of HCM in 43 patients

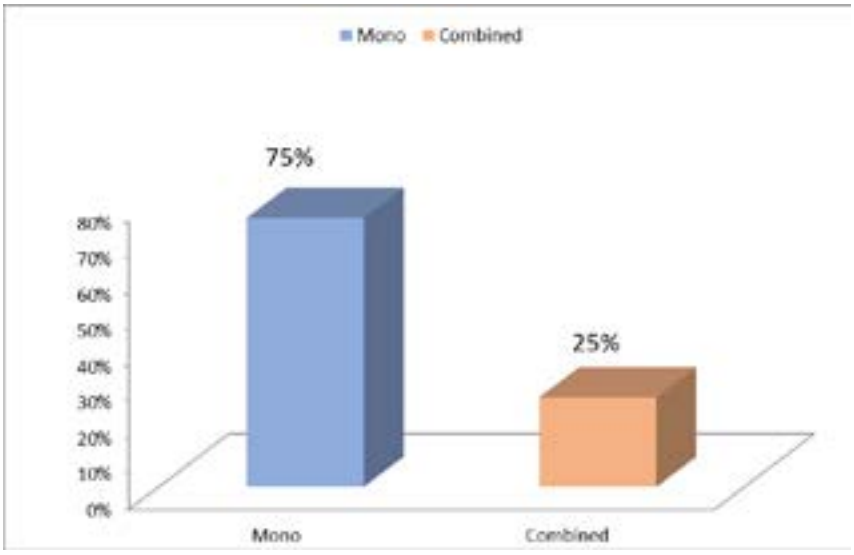

Figure 6 – Types of mutations

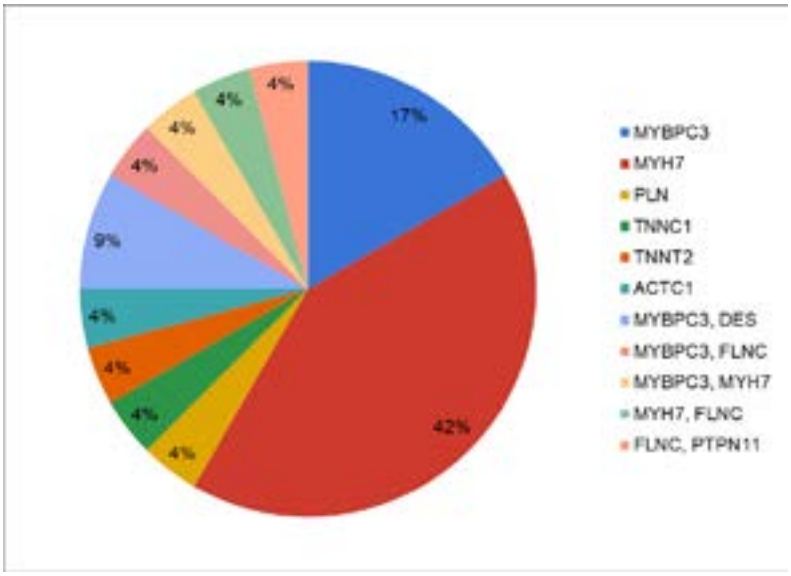

Figure 7 – Ratio of mutation varieties

According to our data (Figure 7), as well as, to the world literature, in most cases mutations were detected in the myosin heavy chain (MYH7 – 42%) and myosin-binding protein C (MYBPC3 – 17%), other variants were registered in 4-8%.

In the group of operated patients (21 patients), 12 (57%) patients had various mutations. Also, in 4 patients, we tracked a family history, with 1 patient who had all 3 children with mutations of the same type, in 1 operated patient, mother and aunt had identical mutations, and in 2 patients, mothers had mutations that did not match with children.

Conclusions

The study allowed us to analyze the main characteristics of the hypertrophic cardiomyopathy associated with the biology of sarcomeres. Establishing a diagnosis with a high risk of SCD dictates the need for more active tactics in relation to this category of patients (clarification of drug therapy, implantation of defibrillators-cardioverters and/or surgery). The strategy of therapeutic measures in HCM is complex even when analyzing the entire complex, including the results of gene diagnostics, clinical manifestations, anamnesis, hemodynamic parameters, and evaluation of the effectiveness of the treatment methods used. Of the clinical symptoms, dyspnea was manifested during physical exertion with syncopal phenomena in the form of dizziness and lipothymia. In recent years, scientific advances have given us the opportunity to find something new. This is the first time for us to study the genetic role leading to hypertrophic cardiomyopathy, understanding the major pathways involved in the underlying pathogenesis leading to the full spectrum of clinical phenotypes. The advent of NGS technologies has led to an expansion of the list of variants and genes involved in HCM.

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MULTISYSTEM-INFLAMMATORY SYNDROME (MIS-C) IN NEONATE ASSOCIATED WITH SARS-COVID19

Background: Multisystem-Inflammatory Syndrome in Children (MIS-C) is a rare complication of COVID-19 infection in the pediatric population which greatly enhances the risk for thrombotic complications including disseminated intravascular coagulation (DIC). Furthermore, treating complications of DIC is complex as treating one complication can exacerbate the other, and the underlying COVID-19 infection and MIS-C as a whole. This makes choosing the most appropriate treatment difficult.

Aim: To report on case of MIS-C in neonate who developed DIC with multiple thrombotic and hemorrhagic events.

Methods: In our study, we analyzed a clinical case of a neonate diagnosed with MIS-C who developed DIC with damage to the heart, kidneys, lungs, liver and adrenal glands.

Results: After infection with SARS-CoV2, MIS-C developed which led to systemic inflammation that triggered DIC, as proven by laboratory markers. DIC led to thrombotic and hemorrhagic events that affected multiple organs, which led to the following: Pre-renal Acute Kidney Injury-renal failure, acute adrenal insufficiency (Waterhouse-Friderichsen syndrome), ileofemoral thrombosis, right atrial thrombosis, Left ventricle thrombosis and fixed aortic thrombosis. Furthermore, the treatment of MIS-C and that of the complications of DIC were contraindicated on several occasions.

Conclusion: This case demonstrated that MIS-C and DIC modulated each other which worsened the prognosis for this neonate initially. With many critical comorbidities the treatment for this case became complex, treating one complication would exacerbate the other, especially noted when the neonate suffered adrenal hemorrhage. Although prognosis was poor, the neonate recovered due to precise control of treatment tactics by the multidisciplinary team.

Key words: SARS-CoV-2, MIS-C, DIC

Introduction

In late 2019, an outbreak of atypical pneumonia of an unknown etiology took place in Wuhan, China, which was later classified as corona virus disease 2019, (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and announced as a pandemic on 11th March 2020 by the World Health Organization (WHO) [1]. COVID-19 usually presents mildly in children and only in rare circumstances may cause severe disease. However, in April of 2020, the United Kingdom reported cases of 8 children that presented with hyper-inflammatory shock, and had features that were similar with the atypical Kawasaki disease (KD) or Kawasaki disease shock syndrome [2]. Although, similar to KD, it was distinct enough to deserve its own classification as Multisystem inflammatory syndrome in children (MIS-C) by the WHO. The diagnostic criteria by WHO is as follows: Age of 0 to 19 years old, Fever for 3 or more days, no bacterial or other microbial etiology, laboratory markers of inflammation, multi-organ failure with 2 or more systems being involved, and positive COVID-19 infection by PCR, serology or antigen test or exposure 3 to 4 weeks before symptoms [2]. MIS-C causes severe systemic inflammation increasing the risk for thrombotic events and can lead to Disseminated Intravascular coagulation (DIC). The rate of DIC complication in survivors is 0.6% and 71.4% for non-survivors. This depicts that when DIC complicated COVID-19, the disease course was very severe and rate of fatal cases steeply increased [3]. In this report we analyzed the progress, treatment tactics and the successful recovery of neonate with MIS-C and DIC with severe thrombotic and hemorrhagic events.

Materials. Case Report

On 03.03.2022, a 1-month-old female patient was admitted to Pediatrics infectious disease hospital with complaints of refusal of the breast, regurgitation, vomiting and diarrhea several times a day, and persistent fever lasting 3-4 days. The results of RNA virus PCR (SARS-CoV-2) were negative on admission. Treatment was viferon (interferon alpha

2b), motilium and infusion therapy. The complaints persisted and condition worsened in the evening with dyspnea.

The prenatal history was complicated. The mother had chronic arterial hypertension 1st degree, gestational diabetes, preeclampsia, anemia 1st degree at 20 weeks, SARS-CoV-2 at 30 weeks, and physiological childbirth at 40 weeks. In birth history, the birth weight and height of the patient was within normal range and she was vaccinated for BCG and HBV.

In past medical history, at 10 days of age, (05.02.22), COVID-19 infection was confirmed positive through PCR, and 5-day inpatient treatment initiated. During this period, she also developed acute bronchitis, and acute respiratory insufficiency. After inpatient treatment, she showed good recovery at that time.

On 04.03.2022, 7:50, the patient was transferred to ICU with somnolent consciousness, reduced reaction to painful stimuli, dyspnea, episodes of apnea, severe pallor of the skin and central cyanosis. Her vitals on admission were: temperature of 36 degrees Celsius (decreased due to shock and subsequent hypo-perfusion), respiratory rate of 60/min, and heart rate of 278/min which prompted an ECG and she was diagnosed with supraventricular tachycardia. Blood pressure and SpO2 were too low to be detectable and she was diagnosed with cardiogenic shock. She was then immediately intubated and put on a ventilator. At 8:00 Echocardiography of the heart revealed intraventricular septum (IVS) hypertrophy, signs of endocarditis, thrombosis in right atrium and moderately reduced myocardial contractility. At 8:49, ultrasound of hepatbiliopancreatic region revealed severe flatulence, reactive parenchymal changes in liver and bile stasis, and ultrasound signs of hypoxia of parenchyma of both kidneys. At 09:30 there was a violation of the heart rhythm, followed by cardiac arrest. After successful resuscitation, cardiac activity was restored but patient went into a coma. Ultrasound of the adrenal glands at 12:22 showed right adrenal gland hemorrhage. At 15:00, the patient had secondary ileofemoral venous thrombosis of the left lower limb confirmed by ultrasound. The left lower limb soon became necrotic (Figure 1). At 18.10, sputum examination showed Streptococcus haemolyticus 10^6, (sensitive to cefazolin, cefotaxime, ceftriaxone), indicating secondary bacterial community acquired pneumonia. Additionally, PCR testing for Cytomegalovirus (CMV), herpes simplex virus (HSV), toxoplasma and chlamydia were negative.

On 05.03.2022, she developed acute kidney injury (AKI)-renal failure, pre-renal origin, confirmed by nephrologist due to cardiogenic shock, and was put on peritoneal dialysis (Figure 2) till 08.3.2022 when kidneys function restored.

Figure 1 – Lower limb necrosis

Figure 2 – Peritoneal dialysis

On the same day, 05.03.2022, MIS-C was diagnosed due to the following: persistent fever for more than 3 days, the symptom onset was around 4 weeks after positive COVID-19-PCR test, there was acute onset of clinical symptoms with right atrial thrombosis, endocarditis, right adrenal gland hemorrhage, AKI, gastrointestinal features of severe flatulence and dyspeptic symptoms, increased IL 6 and ferritin, with normal levels of CRP and procalcitonin (recorded: 04.03.2022) (table 2), marked lymphopenia neutrophilia and increased ESR in CBC (Table 1) and other microbial causes ruled out.

DIC was also confirmed on 05.03.2022, due to: thrombocytopenia and decreased hematocrit (due to adrenal hemorrhage) in CBC (Table 1), an increase in PT, aPTT and decrease in fibrinogen in coagulation profile and increased D-dimer (Table 2).

Additionally, for her CBC (Table 1), she had stage 2 anemia for most of her stay in the ICU, initially because of adrenal hemorrhage and subsequent blood loss, then later due to inflammation. Leukocytosis was present for most of her stay due to her secondary bacterial pneumonia, it normalized on 30.03 due to antibiotic treatment. As seen in Table 2, D-dimer levels remained elevated throughout her stay indicating high severity of disease and Interleukin (IL)-6 and Ferritin were high initially, then there was a rise in all indicators, and afterwards a gradual decrease in all was noted.

Table 1 – Complete Blood Count (CBC)

	04.3 (at admission to ICU)	05.3	10.3	14.3	18.3	30.3	Normal range
Hb g / l	78	96	99	101	118	109	140-240
Hct (%)	21.6	27.2	28.2	28.8	34.5	30.6	42-65
RBC (x 10^12/L)	2.11	2.77	3	3.28	3.95	3.48	3.9-5.9
WBC (x 10 ^ 9/l)	16.9	9.7	29.2	21.8	23.5	9.3	4.5-11
PLT (x 10 ^ 9/l)	173	112	33	106	121	409	150-400
ESR (mm/hour)	6	5	16	17	18	9	1-2
Lymphocytes (%)	55.4	21.5	18.4	10.9	15.6	44.3	45-75
Granulocytes (10^9/L)	9.1	6.9	21.9	18.1	18.3	3.9	1.2-6.8

Hb: Hemoglobin, Hct: Hematocrit, RBC: Red blood cell count, WBC: White blood cell count, PLT: Platelet count, MCV: Mean corpuscular volume, ESR: Erythrocyte sedimentation rate

Table 2 – Coagulation profile and inflammatory markers

	04.03 (at admission to ICU)	05.3	13.03	25.03	30.03	Normal range
Prothrombin time (s)	22.6	21.5	12.3	14.3	25.3	14-18
aPTT (s)	67.90	45.4	32.50	41.50	43.60	28-39
Fibrinogen g/L	1.10	1.9	1.00	2.15	1.18	1.5-3
D-dimer (mg/l)	8.20	0.96	23.6	10.10	9.6	Less than 0.25
Ferritin (ng/ml)	791.3	3618	2372.5	704	650	200-600
CRP (mg/l)	0.37	43.62	39.79	32.1	25	1.5-20
Procalcitonin (ng/ml)	0.176	8.37	2.38	1.95	1.5	0-0.5
Interleukin-6 (pg/ml)	30.09	-	-	-	-	Up to 29.5

CRP: C- reactive protein, aPTT: activated partial thromboplastin time

On 12.03, hepatomegaly and nephromegaly were seen on ultrasound. In table 3, a high level of ALT and total bilirubin indicates liver dysfunction, this matches with the hepatomegaly seen on ultrasound. AKI and nephromegaly resulted in increased levels of creatinine. Hypoproteinemia was significant due to severe inflammation.

Also seen in table 3, she had significant respiratory acidosis throughout her stay with significant hypercapnia. Especially on 16.03, showing decompensated respiratory acidosis. On the same day, chest x-ray showed right sided polysegmental pneumonia. On 27.03, she developed uncompensated metabolic acidosis with pronounced hyperlactatemia, low pH and low HCO3, on the same day chest x ray showed worsening right sided pneumonia with deterioration in dynamics, and she was then diagnosed with severe ventilator associated pneumonia.

Table 3 – Biochemical blood tests and Blood gas analysis

	04.3 (at admission to ICU)	06.3	10.3	16.03	26.3	28.3	Normal Range
ALT U/I	275.000	1137.000	350.000	54.000	33.000	27.000	10.000-40.0000
Total Bilirubin mmol/l	46.4	23.5	14.0	11.40	4.1	8.5	17.1-20.5
Creatinine µmol/l	65.5	66.1	162	77.2	22.6	19.2	12-62
Protein g/l	57.1	58.7	72.2	68.5	54.5	57.7	60-83
Lactate mmol/l	6.6	3.1	3.4	0.7	5.4	1.5	0.2-2.7
pH	7.3	7.28	7.19	7.08	7.19	7.47	7.25-7.45
Pco2 mmHg	43	77	68	88	41	32	35-50
HCO3- mmol/l	19.3	36.2	26.0	26.1	15.7	23.3	17-28

ALT: Alanine transaminase

Echocardiography on 24.3 showed fringed mitral and tricuspid valves with thrombus in left ventricle. Then, on 30.03, with specialist consultation, it was confirmed she has myocarditis, endocarditis due to several vegetations on anterior leaflet of mitral valve, mitral regurgitation grade 2, reduced myocardial contractility, left ventricular hypertrophy, aortic regurgitation grade 1, and fixed thrombus in ascending aorta.

Treatment

On admission to ICU, main concern was her right adrenal hemorrhage which led to acute adrenal insufficiency (Waterhouse-Friderichsen syndrome) and cardiogenic shock, she was thus given dexamethasone and dopamine. For hemostatic therapy, she was administered vikasol(vitamin K3) and etamsylate according to weight. For her supraventricular tachycardia she was given Amiodarone. The next day, for ileofemoral thrombosis, heparin was prescribed 6 times a day, dose according to weight, initiated after her right adrenal gland started stabilizing. She was also started on Cartan intravenously (IV) daily, carvedilol, captopril and spironolactone to prevent arrhythmic attack. Additionally, spironolactone and captopril served as nephro-protective agents and prevented AKI from worsening.

Treatment for MIS-C was started after slight stabilization of kidney function. Passive immunization via immunoglobulins was carried out. Bioven was administered on 06.03, 07.03 and 08.03. Then Bioven, on 31.3. Pentaglobin, was administered on 10.03, 11.03 and 12.03. Anticoagulant therapy prescribed was prescribed for her right atrial, left ventricular and fixed aortic thrombus. Fresh frozen plasma transfusiona, mainly to control her DIC, was given from 04.3 to 22.3. Furthermore, for anticoagulation, she was given hepasan from 10.03 to 21.03 against the background of Fresh frozen plasma. From 21.3 to 22.3 she was given Enoxaparin every 12 hours. Then from 03/24/2022 she was given warfarin orally. For antiviral therapy she was given Viferon (interferon alpha-2b) rectally. Antibacterial therapy for her pneumonia was started from 04.03 to 09.3 with ceftriaxone. Then, from 28.03 Vancomycin (due to worsening picture of pneumonia). Other interventions included omeprazole and almagel for gastro-protection, levimekol for treatment of necrotic surface on left lower limb, fluid infusion, intravenously, and albumin according to weight for hypoproteinemia.

Overall, there were several complications during treatment due to overlapping thrombotic and hemorrhagic complications. Especially when anticoagulant therapy was initiated, there was a high risk of hemorrhagic syndrome and so dosage and time needed to be controlled strictly.

Outcome and follow up: The patient after receiving resuscitation and intensive care therapy gradually recovered from multiple-organ failure without any long-lasting disability. The signs of lower left limb thrombosis were resolved by leaving some skin defects but not affecting limb movements. Further treatment tactics included putting the patient on daily warfarin and patient reference to the rehabilitation center and sustained follow-up by the primary care practitioners.

Discussion

We present a case of MIS in a neonate born to a mother with a history of SARS-CoV-2 infection at 30 weeks of pregnancy and showed positive PCR test result of SARS-CoV-2 at 10 days of life with moderate signs and symptoms of the infection. After being treated symptomatically at the local Pediatric Infectious Diseases hospital the patient was discharged with no symptoms of infection. The second admission of the patient was accompanied by severe symptoms including fever, gastrointestinal symptoms, atrioventricular conduction abnormalities, and evidence of coagulopathy which allowed us to suspect multisystem inflammatory syndrome. The diagnosis of MIS was based on the multisystem involvement and the presence of specific immunoglobulins for SARS-CoV-2. During the second inpatient care, the patient's condition progressively deteriorated leading ultimately to paroxysmal supraventricular tachycardia with further development of cardiogenic shock. At the time of admission to PICU (pediatric intensive care unit), the patient presented mainly with significant signs and symptoms of shock. In the beginning, it was unclear whether this condition developed from the manifested acute bacterial or viral infection which could have led to the septic shock. However, further investigation of past history laboratory tests (elevated levels of markers of inflammation, IL-6, D-dimer, PT, and PTT) and clinical examinations pointed out multisystem inflammatory syndrome. It is important to note that this patient previously had the case of SARS-CoV-2 infection with a positive nasopharyngeal swab RT-PCR test on the tenth day of life and during the second time of admission though SARS-CoV-2 infection was not detected on PCR the patient had a positive test for SARS-CoV-2 immunoglobulin (IgG) in serum. Apart from resuscitation and the measures to stabilize the patient's condition in accordance with guidelines on therapeutic management of hospitalized pediatric patients with multisystem inflammatory syndrome recommended by the CDC (Center for Disease Control and Prevention) and the NIH (National Institute of Health), intravenous immunoglobulin (IVIG) and corticosteroid, and anticoagulant therapy was initiated. However, despite elevated levels of D-dimer and thrombotic necrosis of the lower left limb, the patient developed DIC (disseminated intravascular coagulation) which forced us to discontinue unfractionated anticoagulant therapy temporarily till the condition stabilized. We assume that our report suggests both the presence of MIS-N (a multisystem inflammatory syndrome in the neonates) along with MIS-C (a multisystem inflammatory syndrome in children) which is an established entity of SARS-CoV-2[4]. The multisystem inflammatory syndrome is a relatively new condition in children, in which the exact mechanism is still unclear. It is thought to be due to immune dysregulation following exposure to SARS-CoV-2[5]. A few case reports suggest that neonatal multisystem inflammation occurs secondary to maternal SARS-CoV-2 infection [6, 7,8,9,10] which again proves our assumption on MIS-N and MIS-C. We present this case in order to increase awareness of the possibility of similar cases among pediatric care providers. We think that the maternal infection during pregnancy resulted in the development of protective IgG antibodies against the spike protein of the virus. Later these antibodies pass the placenta and through breastmilk provide passive immunity to the newborn [11]. Multiple studies suggest that the transfer ratio of IgG was more than 1.0 and there was a positive correlation between maternal and infant antibody titers [15]. However, in some genetically susceptible children, autoantibodies triggered by infection may bind to receptors in neutrophils and macrophages causing activation and secretion of pro-inflammatory cytokines that result in the development of multisystem inflammatory syndrome [13,14,15]. Additionally, we speculate that there are also antibodies produced against endothelial, gastrointestinal, and immune cells that may potentially play a role in the complexity of symptoms. As we mentioned our patient received immunomodulatory therapies (intravenous immunoglobulin and steroids), and anticoagulants (unfractionated heparin, enoxaparin, warfarin). We suggest that further studies are needed to evaluate the benefits and risks of given therapies explicitly focusing on patients with multi-organ failure (cardiac, kidney, etc.) We also admit that there were probably some medications that might be contraindicated in this kind of patient like interferons or probably overtreatment with IVIG as immunoglobulins carry a potential risk

of necrotizing enterocolitis among the neonates [16] but the complexity of the patient's condition and the potential threat of this neonate dying outweighed the other risks.

Conclusion

We conclude that history of post – SARS-CoV-2 infection in newborn and maternal history of infection for some genetically predisposed children may pose benefits as well as risks of developing multisystem inflammation with further manifestation of multi-organ failure. We recommend that in examination of neonatal patients with history of SARS-CoV-2 post-infection or born to mothers with history of SARS-CoV-2 during pregnancy MIS-C or MIS-N should be considered after carefully excluding of all potential causes of such condition in children.

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ANALYSIS OF CESAREAN SECTION RATE USING THE 10-GROUP ROBSON CLASSIFICATION SYSTEM AT ABU ALI SINA TEACHING HOSPITAL

Background: Cesarean section (CS) rate is rising worldwide including in Afghanistan. Access to CS indicates maternal quality care in a healthcare system, but higher rates are associated with increased maternal-fetal mortality due to CS severe complications. The WHO recommends the Robson classification to monitor the rational use of CS. This study aims to analyze the CS rate at Abu Ali Sina Hospital based on the 10-Group Robson classification.

Methods: This retrospective cross-sectional study was conducted at Abu Ali Sina Hospital, a tertiary care teaching hospital in Balkh, Afghanistan. The data was collected from medical documents of all women who delivered in February-March 2022. Women were classified into Robson 10 groups then the total rate of CS, absolute, and relative contribution of each group to the overall CS rate was calculated.

Results: Among 2858 women delivered during the study period, 567 (19.8%) had CS. Group 5 (35.8%) was the largest contributor to the overall CS rate. 122 (61%) of women in this group had undergone pre-labor CS. Group 1 (18.5%), and Group 3 (13.2%) were the second and third largest contributors to the total CS.

Conclusion: This study revealed that Group 5 was the main contributor to the overall CS. The previous CS scar was the most common indication of repeated cesarean delivery. Furthermore, high rates of CS were observed in low-risk group women. We also identified that the Robson classification can be implemented as a monitoring tool in all settings in Afghanistan even those with a lack of facilities.

Key words: Cesarean section (CS), Robson, childbirth, complications with CS.

Introduction

World Health Organization (WHO) declares increasing rates of cesarean section globally without any sign of a downtrend. Worldwide cesarean section rate was 1/14 (7%) in 1990 and has risen 3 times in the last three decades as it accounts for more than 1/5 (21%) of childbirths today. Whether this trend continues the cesarean section is likely to compose 1/3 (29%) of all births at the end of the current decade. Despite the worldwide projection, there is a significant difference between high-income countries with an average of 27.2% and low-income countries with an average of 8.2% rates. That shows over-intervention and lack of access to CS in different countries of the world [1-2].

WHO recommends efforts to provide CS for women when medically indicated rather than striving to achieve a specific rate. On the other hand, WHO also considered a rate of between 10-15% as an ideal and reasonable rate for CS, and a rate higher than this is unjustified [3]. A longitudinal study on 19 developed countries conducted in 2014 indicated that a higher CS rate of more than 10-15% cannot decrease maternal and perinatal morbidity and mortality rate [4].

Reasons for the increasing rate of cesarean deliveries differ among countries and include maternal request [5], fear of pain and trauma to the genital tract and fetus during labor and delivery, fear of prolonged delivery, fear of repeating traumatic delivery, and history of infertility [6]. In addition factors like doctor's encouragement, urban lifestyle, having first pregnancy at older ages, weight gain during pregnancy, and unnecessary cesarean sections in private practices for financial benefits of both doctor and hospital are included in the extent of the rise of cesarean deliveries. [7,8].

So far an increase in maternal-neonatal quality care, implementation of standard programs, physical changes in delivery rooms for increasing mothers' privacy, utilization of pain-reducing birth methods, and preparation classes have not seemed to significantly impact on CS rate. Thus FIGO suggests some strategies including equal fee for doctors in case of assuming both vaginal or cesarean delivery, mandatory publication of CS rates, awareness of women on advantages and risks of CS, allocation of obtained money from decreasing CS rate for

resources that favors vaginal delivery, and use of a classification system for proper monitoring of rational use of CS [9]. These strategies must be implemented in all governmental and private hospitals to reduce the rate of CS.

In a systematic review of 27 classification systems conducted in 2011, Robson's 10-Group classification system was the best method with all the characteristics to meet the international and local requirements. The Robson classification system is applicable in both high and low-income nations and is capable of evaluating, analyzing and comparing obtained CS rates within and across the health facilities with the purpose to improve care [10]. Furthermore, the classification system is accepted internationally, and WHO as well as FIGO recommend the system implementation as a worldwide standard for practice in various facilities responsible for delivery. The Robson Ten-Group classification system is well-defined, robust and easily implementable with mutually exclusive and totally inclusive groups of women. Women are categorized based on 6 basic obstetric parameters (parity, previous cesarean sections, gestational age, type of labor onset, presentation of fetus, and the number of fetuses) (Table 1).

Table 1 – The Robson Classification with subdivisions

Groups	Obstetric population
1	Nulliparous, single cephalic, >37 weeks in spontaneous labor
2	Nulliparous, single cephalic, >37 weeks, induced or CS before labor
2a	Labor induced
2b	Pre-labor CS
3	Multiparous (excluding previous CS), single cephalic, >37 weeks in spontaneous labor
4	Multiparous (excluding previous CS), single cephalic, >37 weeks, induced or CS before labor
4a	Labor induced
4b	Pre-labor CS
5	Previous CS, single cephalic, >37 weeks
5.1	With one previous CS
5.2	With two or more previous CSs
6	All nulliparous breeches
7	All multiparous breeches (including previous CS)
8	All multiple pregnancies (including previous CS)
9	All abnormal lies (including previous CS)
10	All single cephalic, <36 weeks (including previous CS)

Assessment of data collection, quality control, clinical management and assessment of strategies for optimizing rate of CS where necessary are the advantages of this Robson classification [3].

The overall CS rate in Afghanistan has raised from 2.7% in 2015 to 6.6% in 2018 [11]. Although this is an optimal rate of CS and rates below 5% indicate a lack of access to the lifesaving procedure, it shows a sharp increase (2fold) in a short time interval and an alarm for the future. Moreover, there is a wide disparity in CS rates within the country and urban/rural regions. Health surveys indicate a rate of 8.2% utilization of CS in urban areas while only 1.9% in rural areas [12]. War, international conflicts, drought and the famine within four decades ruined the healthcare infrastructure and have resulted in Afghanistan being among the 10 countries having the highest maternal mortality rate [13]. Higher rate and unjustified use of CS in a low-income country with limited resource settings, low obstetric quality care, and maternal poor access to the health facilities [14] are associated with potential risk and a dramatic increase in maternal mortality rate that can harm an already challenged health care system.

We, therefore, aim to analyze the overall rate of CS and target groups that make the highest contribution to the overall cesarean sections using the Ten-Group Robson classification system in the maternity department of Abu Ali Sina teaching hospital, Balkh, Afghanistan.

Materials and Methods

This retrospective cross-sectional study was conducted for two months from 1 February to 30 March 2022 at Abu Ali Sina Regional hospital in Balkh, Afghanistan. This hospital is the largest public and teaching healthcare center in the northern region of Afghanistan with approximately 20000 deliveries per year and serves as a tertiary center for referred high-risk cases from fourteen relevant districts. The study population included women who gave birth to a live or stillborn baby of ≥28 weeks gestational age. Cases with rupture of the uterus, gestational ages before the fetal viability (<28 weeks), and cases with incomplete information of variables preventing classification to one of ten groups were excluded. The Robson classification implementation manual organized by WHO was used as a tool for guidance [15]. The data was collected from the patients' medical records by an experienced nurse using a chart with relevant core variables utilized for the Robson 10-Group classification. The variables included parity (nullipara or multipara), number of previous cesarean deliveries (none, one or more), gestational age (term or preterm), the onset of labor (spontaneous, induced, or pre-labor cesarean section), number of the fetus (single or multiple), and presentation or lie of the fetus (cephalic, breech or oblique). Based on the variables, all women were categorized into one of the Robson 10-Group classifications. Data were entered in IBM SPSS Statistics version 28.0 data view and then analyzed. For each Robson group, the total number of CS and vaginal deliveries were calculated, then the rate of cesarean sections within each Robson ten group, absolute group contribution, and relative group contribution to the overall CS rate was calculated. The results were shown according to the Robson report table introduced by WHO [15].

Results

A total of 2873 women attended the obstetric ward for labor and delivery during the 2 months. Fifteen patients were excluded from the study for uterine rupture, gestational age lower than 28 weeks, and missing or questionable data. Therefore, a total of 2858 deliveries were analyzed. Table 2 summarizes the basic characteristics of those women delivered at Abu Ali Sina Hospital during the study period.

Table 2 – Characteristics of women giving birth at Abu Ali Sina Hospital Balkh, Afghanistan, February-March 2022

Characteristics	(N)	(%)
Parity		
0	726	25.4
1-4	1646	57.6
≥5	486	17
Gestational age		
<37	95	3.3
≥37	2763	96.7
Fetal presentation/lie		
cephalic	2778	97.2
Breech	66	2.3
Transverse/oblique	14	0.5
Number of fetus		
Single	2828	99
Multiple	30	1
Prior C/s scar		
none	2552	89.3
1	219	7.7
>1	87	3
Onset of labor		
Spontaneous	2426	84.9
Induced	302	10.6
Pre-labor C/s	130	4.5
Mode of delivery		
Vaginal	2291	80.2
Cesarean section	567	19.8
Mode of C/s		
Emergency	461	81.3
Elective	106	18.7

The Proportion of each Robson groups, CS rate, and their relative and absolute contribution to overall CS rate in Abu Ali Sina Hospital, Afghanistan, February-March 2022 were presented on table 3. The overall rate of CS was 19.8%.

Table 3 – Proportion of each Robson groups

Robson Group	Total Number of CS in each group	Total number of women in each group	Group size[1] (%)	Group CS rate[2] (%)	Absolute group contribution to overall CS rate[3] (%)	Relative group contribution to overall CS rate[4] (%)
Group 1	105	526	18.4	19.9	3.7	18.5
Group 2	45	142	4.9	31.6	1.6	7.9
2a	33	130	4.5	25.4	1.2	5.8
2b	12	12	0.4	100	0.4	2.1
Group 3	75	1558	54.5	4.8	2.6	13.2
Group 4	44	168	5.9	26.1	1.6	7.8
4a	22	146	5.1	15.1	0.8	3.9
4b	22	22	0.8	100	0.8	3.9
Group 5	203	281	9.8	72.2	7.1	35.8
5.1	122	200	7	61	4.3	21.5
5.2	81	81	2.8	100	2.8	14.3
Group 6	20	26	1	76.9	0.7	3.5
Group 7	22	37	1.3	59.5	0.8	3.9
Group 8	10	30	1	33.3	0.3	1.8
Group 9	13	13	0.5	100	0.4	2.3
Group 10	30	77	2.7	38.9	1	5.3
Total	**567**	**2858**	**100**	**19.8**	**19.8**	**100**

1. Group size (%) = n of women in the group / total N women delivered in the hospital x 100
2. Group CS rate (%) = n of CS in the group / total N of women in the group x 100
3. Absolute contribution (%) = n of CS in the group / total N of women delivered in the hospital x 100
4. Relative contribution (%) = n of CS in the group / total N of CS in the hospital x 100

Group 3 (multiparous women without a previous CS, single cephalic pregnancy, ≥37 weeks, spontaneous labor) made the greatest proportion among the women who attended for labor and delivery accounting for 54.5% followed by Group 1 (Nulliparous women, single cephalic pregnancy, ≥37 weeks, spontaneous labor) which accounted for 18.4% (Table 3).

Women in group 5 (multiparous women, one or more previous CS, single cephalic pregnancy, ≥37 weeks) (35.8%) made the largest contributor of CS to the overall CS rate. Group 1 (18.5%), and Group 3 (13.2%) were the second and third contributors of CS to the overall CS rate. These 3 groups accounted for approximately 68% of CS (Table 3).

Group 5 was further analyzed related to the number of previous cesarean scars, the onset of labor, and indications for CS. The analysis showed that 81 (100%) of women with 2 or more previous cesarean scars and 61% of women with on previous cesarean scar had pre-labor CS. 78 (39 %) women with one previous cesarean scar were able to deliver vaginally. Among women who had undergone repeated CS at present delivery, 76 (37.4%) had pre-labor CS while 126 (62.6%) women had spontaneous onset of labor, and none of the women were induced (Table 3).

Previous cesarean scar, cephalo-pelvic disproportion, and contracted pelvis were the most common indications of cesarean delivery in women belonging to Group 5 (Table 4).

However, in Group 1 and Group 3 cephalo-pelvic disproportion and fetal distress were the most common indication for cesarean section.

Of the remaining groups, CS was higher in Group 2 and Group 4 accounting for 7.9% and 7.8% of the overall CS rate, respectively. Cesarean section in each group is more than 26% (Table 3). Women with breech presentation either nullipara (Group 6) or multipara (Group 7) had high group CS rates of 76.9% and 59.5%, respectively. Nearly 67% in both multiparous and nulliparous had CS for breech presentation. All women with an abnormal lie in group 9 (single pregnancy with a transverse or oblique lie including women with previous CS) had undergone cesarean delivery.

Table 4 – Indication for cesarean section (Group 5)

Indication for cesarean section	Frequency	Percentage
Previous cesarean sections	92	45.3
Cephalo-pelvic disproportions	19	9.3
Contracted pelvis	18	8.9
Prolonged labor	13	6.4
Postdate pregnancy	10	4.9
Antepartum Hemorrhage	7	3.4
Fetal distress	6	2.9
Maternal request	5	2.5
BOH	2	1
HTN disorder of pregnancy	1	0.5
Others (sever oligo-hydroamnious, mal-presentation)	30	14.8
Total	203	100

Further groups and subgroups analysis indicated that among women with CS at present gestation 53.9% (306) had a previous cesarean scar. Out of these, 71.5% (219) had 1 and 28.5% (87) had more than 1 cesarean scar. In addition, in women with the cesarean section at present gestation 22.9% (130) had undergone pre-labor CS and 10.2% (58) induced for the onset of labor whereas the majority (66.8%; 379 women) had a spontaneous onset of labor. CS rates were higher in multiparous (68%) than nulliparous women (32%).

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Discussion

Cesarean section is a lifesaving surgical procedure but can result in short and long-term complications including hysterectomy, placenta previa, placental adhesions, rupture of the uterus, and maternal mortality. The risk of abnormal placentation increase with the number of previous CS scars [16]. Severe complications are more common in low-income countries due to higher fertility rates, limited resources, and women's poor access to health facilities.

Our study indicated that Groups 5, 3, and 1 were the main contributors to the overall CS rate in Abu Ali Sina Hospital. Among them, women in group 5 (Multiparous women with previous CS) made the highest contribution to the CS rate accounting for 35.8% of the overall CS rate approximately 1/3 of all cesarean deliveries in the hospital.

Although women in Group 5 belong to high-risk groups, the CS rate within this group must not exceed 50-60%. Meanwhile, the Group size is lower than 10% which indicates the CS was overall low in the past years (Table 3). Furthermore, the study revealed that 57.3% (70/122) of women with only one previous cesarean scar attending the labor ward with spontaneous onset of labor and cervical dilatation ≥4 cm had an emergency CS without any trial of labor and 27% (33) of them had a pre-labor cesarean section. Considering the 93% success rate of trial of labor and no significant difference in duration of labor and postpartum complication between vaginal birth after cesarean section (VBAC) and vaginal birth of the non-cesarean (VBNC). Moreover, the risk of early PPH, puerperal complications, and hospital stay is higher in repeated CS than in VBAC [17]. A trial of labor must be considered as an option for these women. Lower quality levels of routine intrapartum and postpartum care e.g. continuous fetal monitoring [18], lack of resources and number of on-duty staff for emergency obstetric cases [19], and a lack of information on their previous Cs can be the factors for physician's reluctancy in the trial of labor. Our finding is consistent with two studies conducted in Egypt where Group 5 made the highest contribution to the overall Cs rate with a high proportion of repeated CS in women with one previous CS who started labor spontaneously and had favorable cervix [20,21].

Women in Groups 1 and 3 made the second and third contributors to the overall CS rate. As such, women in these two groups were the two largest

proportion who attended for labor and delivery. Similar results were observed in studies conducted in Ethiopia and Tanzania [22,23]. Although CS rates within these groups are less prevalent than in Groups 10, 8, 2, and 4. Large group sizes contributed that both groups account for a considerable CS rate to the overall rate. Furthermore, Group 1 and 3 together account for 30% of all CS deliveries. This is merely important hence women participating in these groups represent low-risk women and high rates of CS within these groups call into question the indication of the procedure. Studies already conducted in Tanzania and Brazil with the same classification usage indicated a similar finding of high group CS rate in Groups 1 and 3 [23, 24].

Group 4 also revealed a high rate of CS (26.1%) within the group. CS rate in this group rarely should be higher than 15% [15] and a higher CS rate in this group indicates high rates of failure of induction or pre-labor CS per maternal request. Further group analysis showed that half of the women (50%) in Group 4a with a cesarean mode of delivery had a failure of induction followed by fetal distress (31%). Pre-labor CS was observed in 13.1% of women in Group 4. The result of our study is in accordance with the studies conducted in Zagazig University Hospital, Egypt, and in Brazil with a high Group 4 CS rate of 49.3% and 51.1%, respectively. However, the women proportion in the group was low [21,24].

Whereas the study was conducted in a tertiary care center with a maternal unit and referred cases of obstetric complications from near relevant districts, Group10 showed a high rate (38.9) of CS within the group.

Groups 6 and 7 showed a high rate of CS in breech presentations. Only 33% of breech presentations both in nulliparous and multiparous were delivered vaginally. Due to the high rate of perinatal mortality, neonatal morbidity, and mortality in vaginal term breech delivery compared to planned CS, there is a trend toward elective CS, particularly in settings with no skilled and experienced obstetrician for vaginal breech delivery [25]. Elective Cs in term breech regardless of fetal weight and parity is associated with a decrease in perinatal mortality and better neonatal outcome. However, it is associated with a high rate of CS [26]. Nearly 9.5% of breech presentations with a cesarean mode of delivery had preterm gestations in our study.

To our knowledge, this is the first study conducted in Balkh, Afghanistan to analyze the rate of CS using the Robson Ten-Group classification. The collected data for analysis from the hospitals' medical records was complete. However, the study population is small and carried out in a short time interval and covers only one setting, but it can be an initial point for the following studies to monitor the trend of CS rate in Abu Ali Sina Hospital and compare the result with other hospitals. Maternal age, demographic factors and neonatal outcome that indicates the overall healthcare quality were not included in our study. In future studies, these variables must be considered to have a better knowledge of the care, and early intervention if required to improve the outcome.

Conclusion

In this study, Groups 5, 1, and 3 were identified as the main contributor to total CS at Abu Ali Sina Hospital. We revealed that a previous CS scar was the most common indication of repeat cesarean section. High rates of CS were also observed in women who belong to low-risk groups. In addition, we also identified that the Robson classification can be applied in the data collections system of all settings in Afghanistan even those with a lack of facilities. Further analysis of these target groups is required to recognize the contributing factors and sought for reducing primary CS by applying potential interventions such as evaluation of the current protocols, active management of labor, and mandatory use of partograph to allow women with previous CS scar to have a TOLAC, encourage the use of vacuum extraction, auditing CS decisions and increase patients about awareness of advantages and risk of CS.

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CLINICAL AND MORPHOLOGICAL CHARACTERISTICS OF COVID-19 ASSOCIATED MYOCARDITIS

The article is devoted to the actual problem in the case of ongoing COVID-19 pandemic – the clinical and morphological characteristics of COVID-19 associated myocarditis in conditions of non-widespread of this topic.

The aim of the study is to study the clinical and morphological features of COVID-19 associated heart damage in deceased patients. The study included data from medical cards of inpatients of Almaty City cardiological center, as well as postmortem data of 12 patients (9 men and 3 women, average of age 65,6 ± 13,8, 51–80 years), dead patients with a diagnosis of atherosclerosis-associated diseases. Pathological anatomical autopsy was performed at the Central Pathological Anatomical Department of Federal Health Institution "Central Medical and Sanitary Unit No. 1 of the Federal Medical and Biological Agency Hospital №1 Russia. Extrapolating data from the pathomorphological study of deceased patients, who had a history of coronavirus infection and died from circulatory system diseases, on autopsy it was found that SARS-Cov-2 infection led to the development of subacute/chronic myocarditis. Its clinical manifestations develop within 4-6 months or more than a year after acute COVID-19 in the form of myocardial infarction or progressive heart failure. The researchers also emphasize the extreme importance of performing autopsy studies of any nosology in combination with COVID-19, for subsequent clinical and morphological analysis, which provide invaluable opportunities to summarize each morphological manifestation of this infection to be further compared to clinical manifestations.

Thus, at present, any unclear myocardial dysfunction requires serodiagnosis of a new coronavirus infection. SARS-Cov-2 infection can cause chronic nonbacterial lymphocytic thromboendocarditis with an autoimmune mechanism; as well as its combination with lymphocytic myocarditis. Research in this field still needs to be continued.

Key words: coronavirus infection, autopsy, COVID-19, myocarditis, pathological signs of myocarditis, histology, alveolar damage with desquamation.

Introduction

Structural changes in the myocardium during coronavirus infection have been described by many authors. According to researchers from Wuhan myocardial damage was diagnosed in 5 cases, out of 41 patients [1]. COVID-19 is associated with numerous cardiovascular pathologies, including myocarditis, acute myocardial infarction, endo- and pericarditis, small-focal cardiosclerosis, and cardiomyopathy [2]. At the same time, this period after acute COVID-19 vary from several months to six months or even more. [2-4]. Cardiovascular manifestation in COVID-19 is diverse: acute myocardial infarction, myocarditis, stress-induced cardiomyopathy, non-ischemic cardiomyopathy, coronary spasm [5-7]. The progression of cardiac symptoms in some patients became the basis for the study of the level of immunoglobulins G (IgG) to SARS-Cov-2 and the retrospective diagnosis of this infection.

There appeared a cohort of newly diagnosed patients, presenting dilatation of all cavities of the heart and a decreased ejection fraction less than 50%, refractory to standard therapy for chronic heart failure, with clean coronary vessels according to coronary angiography [7].

Cardiomyopathy in COVID-19 has been described in a limited number of works and, according to the reference materials it occurs in 33% of cases [8-10]. Lymphocytic pericarditis and endocarditis may develop in association with COVID-19-associated lymphocytic myocarditis. The endocardium is often thickened, sclerosed, with residual effects of endocarditis (lymphoid infiltrates) [11,12].

Our observations of the treatment of cardiological patients at the city cardiological center demonstrate that more than 50% of patients got sick with COVID-19 and suffered deterioration of their condition (blood pressure drops, weakness, increased dyspnea, palpitations, rhythm

disturbances, a significant decrease in exercise tolerance and etc.).

After a scientific and practical conference about the results of COVID-19 in 2021, where Dr. Bukeshov M.K. presented autopsy data of patients with COVID-associated myocarditis, we have an idea for a joint study of heart lesions after a coronavirus infection and identification of clinical and laboratory data from patients with autopsy data.

Purpose of the study: Study of clinical and morphological features of COVID-19 associated heart diseases in deceased patients.

Materials and Methods

The study included data from medical cards of inpatients of Almaty City Cardiological Center, as well as postmortem data of 12 patients (9 men and 3 women, average of age 65,6±13,8, 51–80 years), deceased patients were diagnosed with atherosclerosis-associated diseases. According to the pathoanatomical autopsy conclusion all of them had been diagnosed with "post-covid myocarditis". Pathological anatomical autopsy was performed at the Central Pathological Anatomical Department of Federal Health Institution "Central Medical and Sanitary Unit No. 1 of the Federal Medical and Biological Agency of Russia, Hospital №1.The entry criteria included presence or noticeable progression of symptoms of heart damage (rhythm disturbances, myocardial infarction, progression of heart failure), with a history of coronavirus infection, verified serologically or PCR-positive for COVID-19 autopsy biomaterial, in the presence of morphological criteria for myocarditis of autopsy materials according to 2013 ESC guidelines/or Dallas criteria for myocarditis. The exclusion criteria were hemodynamically significant (more than 50%) including coronary artery stenoses (for patients older than 40 years), acquired heart defects, hypertensive heart (hypertrophy more than 14 mm), diffuse connective tissue diseases, systemic vasculitis, sarcoidosis, dilated cardiomyopathy.

Results and Discussion

Lifetime diagnosis of COVID-19 was confirmed by positive PCR results in two cases and the subsequent appearance and persistence of anti-SARS-Cov-2 IgG in all patients according to autopsy data. At the time of admission to the clinic, the PCR test was negative in all patients. The low percentage of positive nasopharyngeal smears is due to their late performance or their failure (no suspicion of COVID-19). COVID-19 was suspected and diagnosed retrospectively in 3 patients and all of them had COVID-19 in their history. There were no hospitalizations for COVID-19 in any case.

In the morphological part of the study there were used data from autopsy materials of those who died in the hospital, who stayed no more than 2-3 days. All those who died with a relatively moderate clinical severity of the condition had an unexpectedly fast rate of death, a sudden development of bradycardia with a sharp transition to asystole with respiratory depression, with a stable high saturation in the previous state. The clinical course of all autopsy cases was not expected to show such rapid lethal outcomes, which attracted the special attention of researchers in the first place. The data of the medical record of clinical cases and the results of autopsy in a comparative analysis also corresponded to the cardiac mechanism of death, which was characterized by a bright short cardiac thanatogenesis, in autopsy cases it was unambiguously confirmed by the results of macro- and microscopic studies of pathological processes in various organs, especially in the myocardium. These data allowed considering that the main pathological substrates for this study were myocardial lesions during or after COVID-19. In addition, autopsy clinical findings were also summed up individually in the context of polyorgan autopsy morphological changes, which made it possible to evaluate the previous or persistent COVID morphology in various organs, although not all had a previous respiratory history.

For the clinical part, each case in this study was analyzed by stationary data based on clinical, laboratory and instrumental observations with further differential assessment in terms of traditional pathophysiological presentations currently existing in COVID-19 in combination with various comorbid diseases.

Bilateral viral pneumonia was diagnosed in 3 out of 12 patients who underwent computed tomography (CT) of the chest: in one case, the volume of the lesion did not exceed 25% (CT-1), in two patients it was 25–50% (CT-2). These patients developed grade 1 respiratory insufficiency; however, there was no need for non-invasive or invasive ventilation.

Troponin levels were not assessed. The cause of the last hospitalization during which death occurred: 10 of the 12 deceased had acute coronary syndrome, which in 5 patients was transformed into type 2 myocardial infarction, in 1 – into an aneurysm rupture, in 2 – into unstable angina, in 2 – cardiomyopathy with decompensation of CHF (1- dilated cardiomyopathy and 1- ischemic cardiomyopathy). One patient was admitted with a clinic of hypertensive crisis and the development of stroke, and only 1 patient with a clinic of community-acquired pneumonia.

All patients had echocardiographic signs of left ventricular systolic dysfunction in the form of decreased ejection fraction less than 50%, which were detected in vivo during hospitalization. There were also cardiac symptoms and symptoms of heart failure during the last months before hospitalization (from 1 to 4 months), which gradually increased.

Concomitant diseases. The average body mass index was 26.4±5.6 kg/m2, obesity of the 1st degree was in 1 (8.3%), the 2nd degree in 1 (8.3%), overweight in 4 patients (33.3%), 6 patients (50%) had normal weight.

Two patients had diabetes mellitus type 2, arterial hypertension of the 2nd or 3rd degree – 8 patients, two patients had a history of stroke, each patient in the anamnesis had autoimmune thyroiditis, bronchial asthma, cancer of the uterine body, CKD stage 4, respectively. Lactate more than 2 mEq/l was observed in 10 of 12 patients, which probably indicates increased aerobic and anaerobic glycolysis against the background of a septic state in deceased patients. None of the patients was diagnosed with post-covid myocarditis during their lifetime.

Pathomorphologically, in general in lungs, all the deceased had a similar picture, macroscopically, the lung tissue was anaemic, diffusely compacted, in some cases organized thrombus in the lumen of the segmental arteries, separate scattered subsegmental atelectasis, focal interlobar fresh fibrinous transparent adhesions. They depend on the period of recent covid pneumonia walking through severe (Figure 1).

Figure 1 – Macroscopic changes in lungs after COVID-19,
lungs are compacted, focal atelectasis, interlobar fresh fibrin adhesions

Histologically, the architectonics of lungs is mainly represented by edema of alveolar walls with lymphoplasmacytic infiltration in the background of which there is alveolar damage with desquamation in their lumen, individual alveolocytes are hypertrophied and necrotic. There is observed the formation of multinuclear symplasts (Figure 2). Along the contours of the alveolar walls, there are fragments of hyaline membranes with organized and severe thrombosis of small arteries and arterioles; there are often found lymphocytic cell infiltrations of vessel walls. In some cases, in the background of widespread atelectasis, there are multiple focal sclerosis and fibrosis of alveolar walls, with deformation and the formation of large thick-walled newly formed alveolar lumens with a moderate accumulation of desquamated alveolocytes. Perivascular sclerosis, pronounced edema with disintegration of the walls of arteries and arterioles, thrombi are predominantly erythrocytic. Large veins are empty, the walls with signs of paralysis, the walls of small veins are pronouncedly edematous with plasma impregnation, their stasis is in the lumen. The capillaries of the alveolar walls are sharply dilated, mostly desolate. In the lumen of individual alveoli, along with alveolar desquamation scattered individual intraalveolar edema was observed in some places, in other fields of vision, an accumulation of reticular fibrin, in the background of which focal emphysema was observed in a small area.

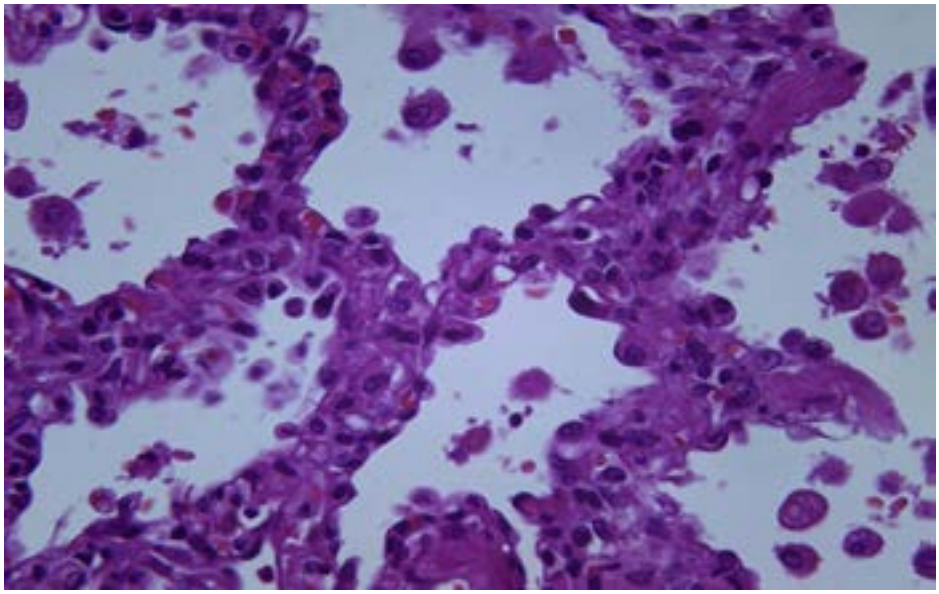

Figure 2 – Alveolar walls are edematous, infiltrated with lymphocytes and plasmocytes, desquamation of alveolocytes, interstitial pneumonia in COVID-19. S tained with hematoxylin and eosin

In the large bronchi, the peribronchial zone is moderately sclerosed, edematous, disintegrated, the muscle component is pronounced edematous, foci of distinct myocytolysis, swelling of the submucosal layer with pronounced plethora with cellular infiltration, subsegmental cytolysis is noted in the peribronchial glands, part of the respiratory epithelium is completely destructed, part is necrotic, in smaller bronchial tubes, there is a spasm of the walls, swelling of the submucosa with plasma impregnation, the respiratory epithelium in them is focally destructed and necrotic.

In the pathoanatomical conclusion, all deceased patients had polysegmental interstitial pneumonia, focal fibrosis of varying severity, vasculitis, mainly arterioles. These data are also confirmed by other authors [11, 13].

The pathomorphological picture of changes in the heart of the deceased made it possible to identify the following myocarditis-like changes: in the pericardium there was serous-hemorrhagic exudate, the volume of which is from 0.2-0.5 ml to 15.0-20.0 ml, macroscopically in the lumen of the aorta and in the cavities of the heart, anemia, color and consistency of myocardium remained unchanged except for infarct variants (Figure 3.). Histologically, stromal inflammation, hypertrophy of cardiomyocytes, large and small-focal scattered non-coronary necrosis, predominantly a separate, single, strip-like form, in rare cases, in places they were confluent, without a perifocal cellular reaction, necrotic foci, sometimes in varying degrees of severity, due to the onset of fibrosis of the necrosis zone with single lymphocytes, acquiring a reticulated appearance, which may indicate the duration of the process. Moderately pronounced arterioarteriolosclerosis, pronounced edema of the walls of large arteries with fibrillation, thrombosis was observed in small arteries. Severe spasm of arterioles with lymphoplasmacytic infiltrates, endothelium swollen nuclei hypertrophied. Congestion of veins, stasis with sludge. Mostly in the stroma and interfascicular space, lymphocytic and plasmacytic infiltrates were observed, sometimes with an admixture of leukocytes, in the background of fibrin exudation.

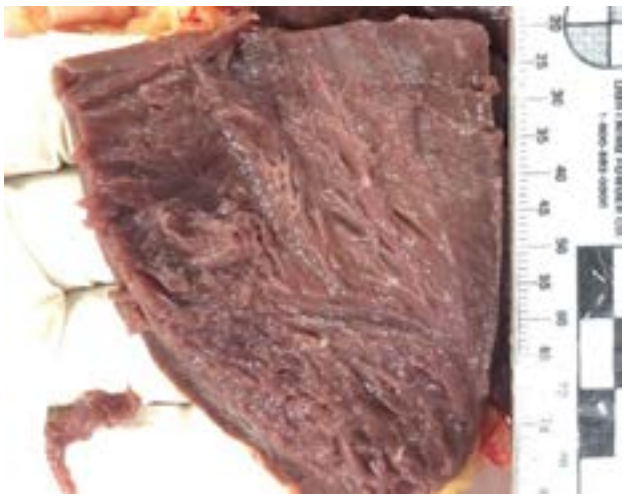

Figure 3 – Macroscopic myocardium of the anterior wall of the left ventricle in COVID-19 associated serous myocarditis

Cellular infiltration is more pronounced in areas with plasma impregnation (Figure 4), in places with necrosis and fibrillation of the vascular walls, mostly of small caliber, sometimes small hemorrhages and deposits of siderophages are noted in the area of cellular infiltration.

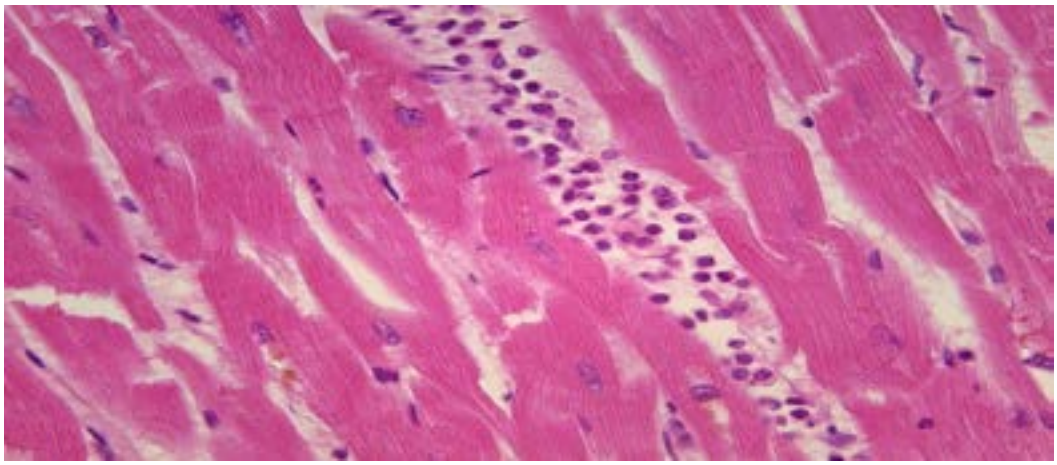

Figure 4 – Myocardial stroma with exudative impregnation, in the background of which lymphocytic and plasmacytic infiltration in the myocardium in COVID-19 associated serous myocarditis. Stained with hematoxylin and eosin

In some cases, subsegmental small foci of myocytolysis were noted, occupying the entire field of view at low magnification. In the background of the above processes, fragmentation, dissociation and wave-like deformations, foci of lumpy decay and occasionally occurring wave-like deformations were traced. In the background of pronounced hypertrophy of the nuclei of cardiomyocytes, in the perinuclear spaces there was non-pronounced strip-like accumulation of small droplets of lipofuscin granules. These macro and microscopic pictures made it possible to identify the following in deceased patients: serous myocarditis. In 7 cases there were observed small-focal non-coronary necroses, which were diffuse and rarely confluent, as well as type II infarcts. Myocardial hypertrophy was detected in all patients.

Conclusion

Extrapolating data from a pathomorphological study of deceased patients who had a history of coronavirus infection and who died of diseases of the circulatory system, on autopsy it was found that SARS-Cov-2 infection led to the development of subacute/chronic myocarditis.

Its clinical manifestations develop within 4-6 months or more than a year after acute COVID-19 in the form of a clinic of myocardial infarction or progressive heart failure. That is, post-covid myocarditis manifested itself in two main clinical forms – infarction-like and decompensation (systolic dysfunction with or without chamber dilatation, as well as type 2 infarcts when comparing EchoCG and autopsy data). Obviously, the main mechanisms of post-covid myocarditis are the long-term persistence of SARS-Cov-2 in the myocardium (cardiomyocytes, endothelium, macrophages) in some patients, combined with high immune activity (high titers of anticardiac antibodies in patients).

Thus, at present, any unclear myocardial dysfunction requires serodiagnosis of a new coronavirus infection. SARS-Cov-2 infection can cause chronic nonbacterial lymphocytic thromboendocarditis with an autoimmune mechanism, as well as its combination with lymphocytic myocarditis. In the treatment of postcovid myoendocarditis, clinically occurring with symptoms of CHF refractory the possibility of using corticosteroids and anticoagulants should be considered along wih treatment and dilatation of the heart cavities or an ACS clinic. Research in this direction needs to be continued.

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RELATIONSHIP OF THE SIZE AND LOCATION OF THE TYMPANIC MEMBRANE PERFORATION IN CHRONIC SUPPURATIVE OTITIS MEDIA WITH THE MAGNITUDE OF HEARING LOSS

Chronic suppurative otitis media is a severe health condition that affects people worldwide. Perforation in the tympanic membrane reduces the surface area of the membrane available for sound transmission. It's important to identify and treat tympanic membrane perforation as soon as possible, since untreated tympanic membrane perforation contributes to chronic disruptive changes in the middle ear, resulting in further hearing loss, which is a major physical and psychological issue that affects people's lives. The study has been conducted to compare the relationship between the location and size of perforation of the tympanic membrane in chronic suppurative otitis media with the magnitude of hearing loss. The cross-sectional prospective study was conducted among 67 patients who visited the Otorhinolaryngology department for myringoplasty. The study period was from January to April 2021, the age group of patients was between 8 and 43 years old. The number of female participants was 35 (52.2%) and males – 32(47.8%) respectively. Average age ±SD was 21.93±9.47 years. Fifty (74.6%) patients had right ear perforation and seventeen (25.4%) with left ear perforation/ It was not statistically significant ($\chi^2=22.891$; p-value=0.290). Most of the patients were with subtotal of (all quadrants) 30 (44.77%), 2-3 quadrants, and one quadrant perforation were 23 (34.32%) and 14 (20.89%) respectively. Most of the patients, i.e.37 (55.22%), had hearing loss between 26-40dB. There was a significant connection between the perforation size and degree of hearing, ($\chi^2=22.891$; p-value <0.0001). In one quadrant perforation, greatest hearing loss was on the post inferior quadrant 29.97±4.32 dB. For 2-3 quadrants perforation the hearing loss was greatest in postero-superior combined with postero-inferior perforation 37.42±9,59dB. The most significant hearing loss was in subtotal perforation mean ±SD was 42.13±7.07dB. Hearing loss increases in proportion to the extent of the perforation, post inferior quadrant alone and combined with the post-super were observed with the greatest hearing loss according to the findings of this study.

Key words: Chronic suppurative otitis media; Hearing loss degree; Perforation; Tympanic membrane.

Introduction

Chronic suppurative otitis media (CSOM) is a severe health condition that affects people all over the world [1]. Chronic suppurative otitis media is characterized by inflammation of a portion or the entire muco-periosteal layer of the middle ear. In spite of improved hygiene and treatment, it is still a major health concern in both developing and developed countries [2-3]. The tympanic membrane, which measures 9–10 mm vertically and 8–9 mm horizontally, separates the external ear from the tympanic cavity. It's an essential part of the sound transmission through the middle ear, and it takes part in impedance matching mechanism of the middle ear cleft [4].

The Perforation of the tympanic membrane (TM) refers to a partial or complete rupture of the eardrum. The tympanic membrane may be perforated as a result of trauma, middle-ear disease, or treatment of the middle-ear disease. Perforated tympanic membrane reduces the surface area of the membrane available for sound transmission, allowing sound to travel directly through the middle ear. As a result, the effectiveness with which the tympanic membrane transmits vibration to the ossicular chain is limited, along with the range of hearing [5-7].

A total absence of tympanic membrane will result in a loss in the transformer action of the middle ear [5]. Hearing loss is a major physical and psychological issue that affects people all over the world. As a result, it's important to identify and treat tympanic membrane perforation as soon as possible, since untreated perforated tympanic membrane contributes to chronic disruptive changes in the middle ear, resulting in further hearing loss [8].

Some tympanic membrane perforations were improperly handled by general practitioners and family doctors, resulting in a delay in visiting otolaryngologists. Chronic TM perforations may

grow as a result of late visits [9]. In chronic otitis media, which affects at least 0.5 percent of the population, perforation occurs as a consequence of the disease process. CSOM can cause conductive hearing loss(CHL) of up to 60 decibels, which is a significant handicap [6].

Aim of the study: To analyze the relationship between the location and size of perforation of the tympanic membrane in CSOM with the magnitude of hearing loss.

Materials and Methods

Study design

This cross-sectional prospective study was conducted in 67 patients who visited the Otorhinolaryngology department of the Aksy University Hospital, Almaty, for myringoplasty (type1 tympanoplasty). The study lasted from January till April 2021.

Study population

Sixty-four cases were done under general surgery and 3 cases – in local anesthesia. Patients with tubotympanic type of CSOM, age group of 8–43 years were candidates for myringoplasty included in this study. Patients under the age of 8 years, as well as those with co-morbid diseases like hypertension, diabetes mellitus, bleeding diathesis, mixed or sensory neural hearing loss (SNHL), CSOM atticoantral type, ossicular chain fixation or disruption are excluded.

According to the extent of perforation, patients were divided into three categories: one quadrant perforation, two or three quadrants perforation, and subtotal perforation (all quadrants or four perforations).

Audiogram and imaging

History was reviewed with full ear, nose, and throat clinical examination for each case. During surgery microscopic analysis confirmed the results from the pre-operative exam. Pure tone audiogram (PTA) was performed for all of them and the grading of hearing loss was scaled according to WHO classification [10]. "Hearing-level" was defined as the mean air conduction (AC) threshold at 500, 1000, 2000, and 4000 Hz, and the average (pure tone average or PTA) of these frequencies was calculated to measure the hearing level.

Audiogram was used to measure conductive hearing loss due to the tympanic membrane perforation. The audiogram close to the time of operation was selected. A pre-operative temporal bone CT scan was mandatory for all cases.

Statistical processing

All data were entered into an Excel sheet. Statistical package for social science 24 (SPSS) was used for data analyses. The chi-square test and t-test were used to analyze the variations in proportions, and for the difference between the mean value of all groups, one-way ANOVA was applied for interpretations, P-value of less than 0.05 was considered statistically significant.

Ethical consideration

All patients provided with their informed consent. None of the authors conducted any human experiments for this paper.

Result

A total of 67 cases (67ears) were studied with number of females being 35 (52.2%) and males – 32(47.8%). All cases were to undergo the myringoplasty. Age mean ±SD were 21.93±9.47 years. Fifty (74.6%) patients had perforation in the right ear and seventeen (25.4%) – in the left ear (Table 1). Right and left ear perforations were not statistically significant (χ^2= 1.117 and p-value =0.290). None of the patients underwent both ear surgeries at the same time.

Table 1 – Characteristics of patients according to the perforations of the ear

N=67		Sex		Total	Test of differences	
		Female	Male		χ^2	p-value
Age mean±SD		22.9±9.6	20.7±9.3		t* 0.944	0.349
Perforated ear N (%)	Right	28(41.79)	22(32.83)	50(74.62)	1.117	0.290
	Left	7(10.44)	10(14.92)	17(25.37)		
CSOM, N (%) (Chief complaint)	Hearing loss	21(31.34)	20(29.85)	41(61.19)	1.282	0.527
	Ear discharge	11(16.41)	7(10.44)	18(26.86)		
	Hearing loss +ear discharge	3(4.47)	5(7.46)	8(11.94)		
Total		35(52.2%)	32(47.8%)	67(100%)		

The mean age for females and males was 22.9±9.6and 20.7±9.3years respectively. Hearing loss was the most common problem in this study. Forty-one (61.2%) patient' chief complaint was hearing loss, while 18 (26.9%) patients experienced ear discharge as common complaint, and 8 (11.9%) patients had both hearing loss and ear discharge (figure1). Symptoms were not statistically significant (χ^2=1.282, p-value =0.527).

Most of the patients showed subtotal perforation (all quadrants) of 30 (44.77%), 2-3 quadrants, and single quadrant perforations were observed at 23(34.32%) and 14 (20.89%) patients respectively. Most of the patients – 37 (55.22%) had shown hearing loss between 26-40dB, 25(37.31) patients –between 41-55dB and 5(7.46) patients – 16-25dB. In categories 1, 2 and 3 between the perforation size and degree of hearing loss there was statistically significant association (χ^2=22.891, p<0.0001). (Table 2) In single quadrant and 2-3 quadrants perforations, most of the patients suffered from hearing loss between 26-40dB. In subtotal perforation most of the patients had hearing loss between 41dB and 55dB.

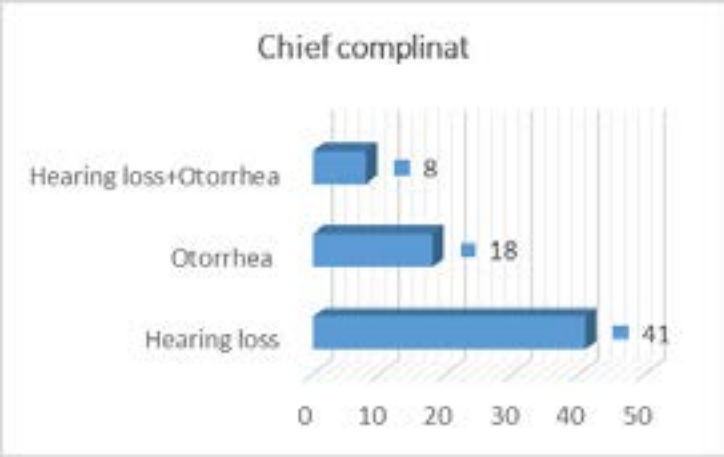

Figure 1 – Chief complaints of the patients

Table 2 – Hearing Impairment According to Perforation Size

		Perforation size			Total	χ^2	P-value
		1 quadrant	2-3 quadrants	Subtotal			
Hearing impairment (in dB, deci Bell) *	16-25dB	4(5.97%)	1(1.49%)	0(0%)	5(7.46%)	22.891	<0.0001
	26-40dB	10(14.92%)	15(22.38%)	12(17.91%)	37(55.22%)		
	41-55dB	0(0%)	7(10.44%)	18(26.86%)	25(37.31%)		
Total		14(20.89%)	23(34.32%)	30(44.77%)	67(100%)		

*According to the WHO classification of hearing impairment [10].

Out of 67 ears, 30 had subtotal perforation, in single quadrant perforation the post inferior quadrant average hearing loss was 29.97±4.32dB. In the anterior superior, anterior inferior, and posterior superior it was 20.06±2.1dB, 23.36±3.89dB, and 25.4±0.85dB respectively. In post sup combined with post inferior perforation, it was 37.42±9.59dB. For subtotal perforation, the hearing loss mean ±SD was 42.13±7. 07dB (figure 2). Between the location of perforation and hearing loss there was a statistically significant association (p=0.003).

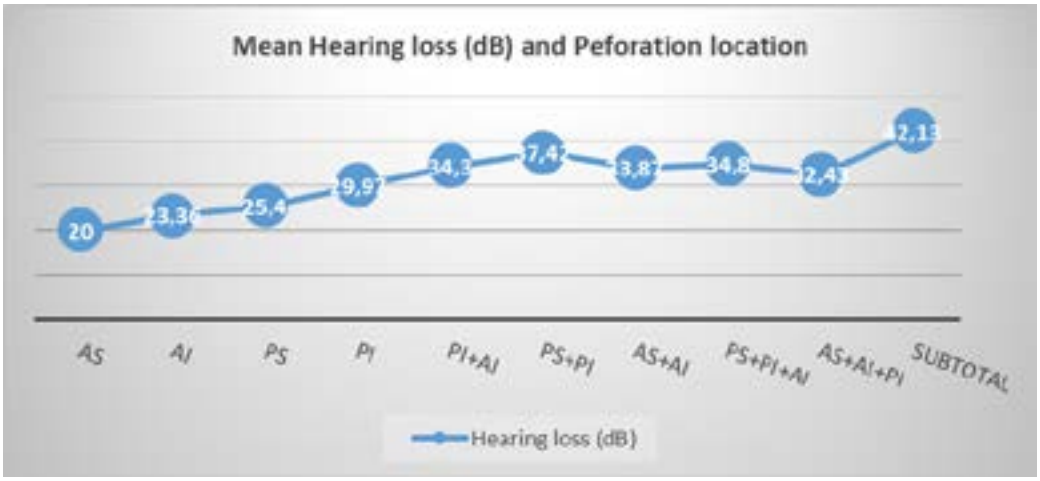

Figure 2 – Hearing loss and location of the perforation
AS=Anterior superior; AI=Anterior Inferior; PS=Posterior Superior; PI=Posterior Inferior;
PI+AI= Posterior Inferior with Anterior Inferior; PS+PI =Posterior Superior with Posterior Inferior;
AS+AI= Anterior Superior with Anterior Inferior; PS+PI+AS=Posterior superior and Posterior Inferior with Anterior inferior;
Anterior Superior and Ant Inferior with Post Inferior= AS+AI+PI.

Table 3 – Site of perforation according to the quadrants of the tympanic membrane

	Location of perforation in quadrant	No of cases	percentage	Hearing loss (dB) mean ±SD		Test of differences
1	Anterior superior	3	4.5	20.06±2.1		
2	Anterior inferior	5	7.5	23.36±3.89		
3	Posterior superior	3	4.5	25.4±0.85		
4	Posterior inferior	4	6.0	29.97±4.32		
5	Posterior inferior with Anterior inferior	4	6.0	34.3±7.09		
6	Posterior superior with Posterior inferior	5	7.5	37.42±9.59		
7	Anterior superior with Anterior inferior	5	7.5	33.87±5.73	F=3.248	P=0.003
8	Posterior superior and Posterior inferior With Anterior inferior	5	7.5	34.8±7.36		
9	Anterior superior and ant inferior with post inferior	3	4.5	32.43±7.67		
10	Subtotal (all quadrants)	30	44.8	42.13±7.07		
		67	100.0			

Table 3 site of perforation according to the quadrants of the tympanic membrane. All quadrants or subtotal perforation made up 30(44.77%) with 42.13±7.07 dB hearing loss, in single quadrant perforation the post inferior quadrant average hearing loss was 29.97±4.32dB; in the Anterior superior, Anterior inferior, and Posterior superior it was 20.06±2.1dB, 23.36±3.89dB, and 25.4±0.85dB respectively. In post sup combined with post inferior perforation, it was 37.42±9.59dB.

Discussion

The mean age of patients was 21.93 years, which points to a high disease burden in the younger age groups. Perforations of the tympanic membrane were linked to conductive hearing loss in varying degrees. The degree of conductive hearing loss was directly proportional to the extent of the perforation, the association was statistically significant (χ^2=22.891; p-value<0.0001). It is comparable with findings of other studies. Their findings matched our study findings showing that the larger perforation on the tympanic membrane is, the greater is the decibel loss in the sound perception [11-16].

The location of the tympanic membrane perforation was linked to the magnitude of hearing loss (one-way ANOVA: p-value = 0.003) as statistically significant. We found that hearing loss was more common in perforations involving the

posterior quadrants. According to many research finding, the location of the perforation has a direct effect on the severity of hearing loss [16-18]. In this study, mean hearing loss due to four quadrants or subtotal perforation was 42.13±7.07. Ant sup and post sup quadrants showed average hearing loss of 20.06±2.1 and 29.97±4.32 respectively. According to Bhusal et.al findings large perforations involving all four quadrants resulted in a hearing loss of 49 decibels, while those in the anterior quadrants showed hearing loss of at least 31 decibels [6]. A similar study showed a higher rate of hearing loss in the posterior perforations. There was observed a 29 dB hearing loss in the posterior perforations and an 18.5 dB hearing loss in the anterior perforations [11]. Mahajan et al. reported that the posterior-based perforations ($p \leq 0.05$) were found to show significant hearing loss [19]. A study conducted at the medical college of the Nepal noted that perforations involving the posterior inferior quadrant showed a 41–53 dB hearing loss in 100 cases [17]. According to the study the greatest hearing loss was linked to posterior perforations, which was 39.99±2.79 dB, followed by central perforations, 35.64±5.31 dB, and anterior perforations, 30.1 ±2.98 dB, respectively[20]. The study showed that postero-inferior perforations of equal size "average perforation size 7.76 mm^2" had a higher average hearing loss (40.07 dB) than antero-inferior ones , which had a lower average (29.30 dB) hearing loss [4].

However, numerous studies deny the impact of the perforation site on the degree of hearing loss [8,18,21] . Since the round window is directly exposed to sound, posterior quadrant perforations show worse hearing than anterior quadrant perforations [19].

Several further studies with a greater number of cases are required to link hearing loss and the location of the tympanic membrane perforation.

Conclusion

The degree of hearing loss increased statistically with increase of the size of perforation, the size of the tympanic membrane perforation has impact on hearing loss. Subtotal perforation causes greater degree of hearing loss. Hearing loss was significant, which was affected by the location of the perforation on the tympanic membrane. The degree of hearing loss was greater in posterior perforations.

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EMERGENCY REPEAT CESAREAN SECTIONS IN WOMEN IN MALALAI AND SHARARA HOSPITALS

Repeat cesarean deliveries are associated with complications of cesarean section (CS) and predisposition to morbidity resulting from placenta previa, morbidly adherent placenta, complicated surgeries, uterine rupture and bladder injury. Successful trial of labor and vaginal birth after cesarean section (VBAC) results in decrease in maternal morbidity. An unsuccessful trial of labor after Cesarean (TOLAC) is defined as failure to achieve a vaginal birth after cesarean section in women undergoing a TOLAC and the delivery ending with emergency cesarean section. In this study we aim to determine the frequency of inter delivery interval and emergency cesarean section attempt at vaginal delivery among women with one previous CS.

The descriptive cross-sectional study was conducted at Malalai and Sharara maternity hospitals in Kabul, for three consecutive months. The collected data were presented as mean, standard deviation (±SD), frequency and percentage.

A total of 204 women with one previous CS out of 180 were eligible for TOLAC according to the hospital protocol and 35 women (19.4%) of the studied women had emergency cesarean, 34.47% women with their inter delivery interval were between 16-19 months most cases of unsuccessful TOLAC 43% were seen among women between 25 to 29 y old with mean age of 26.43 ± 5.6. In our study frequency of repeat emergency cesarean in women with prior CS was found as 19.4%, most cases have been seen in women with short inter delivery interval, most cesarean performed between 37-39 week of gestational age, fetal distress was the most indication of repeat emergency cesareans.

Key words: Cesarean section, emergency, inter delivery interval, trial of labor after cesarean section (TOLAC)

Introduction

Repeat cesarean deliveries are associated with complications of cesarean section (CS) and predisposition to morbidity resulting from placenta previa, morbidly adherent placenta, complicated surgeries, uterine rupture, and bladder injury [1-2].

Trial of labor after cesarean section (TOLAC) is the attempt to give vaginal birth after cesarean section delivery [3].

According to the World Health Organization, countries with a low cesarean section rate of less than 10 percent have the lowest infant mortality rate. Respiratory problems and jaundice in cesarean section babies are more than normal birth babies, which is why respiratory problems in cesarean section babies are more than normal births [4-6].

Repeat cesarean section is one of the most common causes of cesarean section and it has been believed for decades that the uterus has scars due to the possibility of rupture of the uterus as opposed to normal delivery [7-9].

Many years ago, the American College of Obstetricians and Gynecologists began to offer solutions to reduce cesarean section and reach the standard of the World Health Organization by 2010. Among these strategies and suggestions, we can mention vaginal delivery after cesarean section. Vaginal birth after cesarean section can be considered as one of the biggest changes in obstetrics and obstetric care in this century [10].

In a case control study conducted in one of its teaching hospitals in Brazil, the failure rate of TOLAC was 38.3%. In a study conducted by Samantha et al. the emergency CS was reported to be 17% [11]. A study conducted at a medical university in western Kazakhstan in 2010-2013 reported emergencies CS failed TOLAC of 31.1%. In another study conducted by Singh et al. in an Indian hospital the failure rate was reported to be 32.3, with the highest rate of failure due to the presence of myconium and fetal distress [12].

The largest and most recent study included over 25,000 women who delivered between 1995 and 2000. They found that becoming pregnant within 6 months of the previous delivery was associated with a 2.66 increase in odds of uterine rupture, the women who were pregnant within 6 months after their previous cesarean (children spaced less than 15 months apart) had a rupture rate of 2.7% compared to a 0.9% rate for those who waited at least 6 months before conceiving again. The risk factors included inter de-

livery interval less than 18 months. Given that many factors contributing to uterine rupture rate cannot be modified (such as maternal age or birth history) having an inter delivery interval of at least 18 months must be considered [13-14].

However, having an inter delivery interval of less than 18 months should not prevent a mother from considering vaginal birth after cesarean section (VBAC), and the overall risks should be considered in comparison to the risks associated with a repeat cesarean. In most cases obstetricians' scaring about the risk of uterine rupture in women with a previous cesarean section causes women to deliver by repeat cesarean section. A 2006 study by Cahill in the two groups of vaginal delivery after cesarean section and cesarean delivery showed that uterine rupture, bladder injuries and uterine artery injuries were significantly lower in the vaginal delivery group than in the cesarean section. An inter delivery interval shorter than 18 months was associated with a significant increase of uterine rupture whereas one between 18 to 24 months was not significant. Deciding on the type of delivery after cesarean section can affect future pregnancies [15-16].

By doing this research we found documentation of repeat emergency cesarean sections and inter delivery interval important to understand falling VBAC rates and also, we can make a rational decision about the birth plan by extended inter delivery interval and should examine how clinicians and women anticipate, discuss and make decisions about childbirth after a previous cesarean delivery within the context of actual antepartum.

The study aims to determine the frequency of emergency cesarean section in case of failure to deliver vaginally among women with one previous CS, and to examine risk factors.

Materials and Methods

This descriptive cross-sectional study was performed in Malalai maternity hospital and Shahrara teaching hospitals during the period of August 1 – November 1, 2020. Convenience sampling was applied, all pregnant women had previously one cesarean section, and women candidates for normal vaginal delivery (TOLAC patients).

Entry criteria: all pregnant women whose vaginal birth plan failed after cesarean delivery and had another emergency cesarean section, elective cesarean in women with prior CS were included in the study.

Exclusion criteria: patients who did not have a cesarean delivery history, pregnant women who had more than one cesarean section deliveries, and those whose files were incomplete were excluded from the study.

During this period 204 women with prior cesarean delivery were admitted. Out of them 24 women underwent elective CS and 35 emergency CS, women expected TOLAC, 145 of them had successful vaginal delivery.

First, the information was taken from the register book of the examination room and surgery ward, then the desired files from our eligible criteria were collected from the medical record branch, and then the files with an emergency cesarean section due to unsuccessful TOLAC were selected and studied. The special preparation form and use of the SPSS20 software, the information and figures collected were adjusted and analyzed after the data management / cleaning. Because the study is descriptive, the study variables and figures have been expressed by statistical descriptive measurement such as mean, standard deviation (SD), percentage, frequency.

Results

The study had been conducted for three months, totally 204 patients with one previous cesarian delivery were admitted, out of them 24 (12%) women underwent elective CS and 180 women who were candidates for TOLAC, including 35 (17%) who failed to have normal vaginal delivery and had emergency CS and 145 (71%) of them had successful VBAC (Figure 1). Thus, the frequency of repeated cesarean sections was 29%.

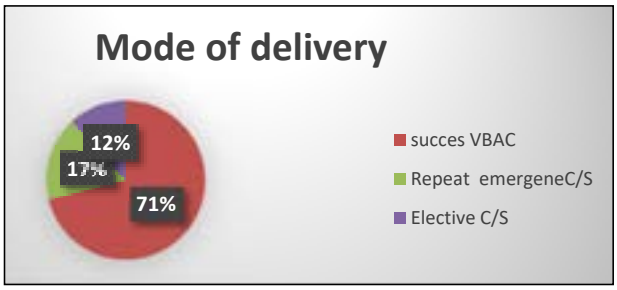

Figure 1 – Above table demonstrated mode of delivery i n women with previous cesarean delivery

Among 180 women who attempted to give birth vaginally after cesarean delivery, 145 (81%) women had successful VBAC and 35 of them (19%) had repeat emergencies cesarean delivery (Figure 2).

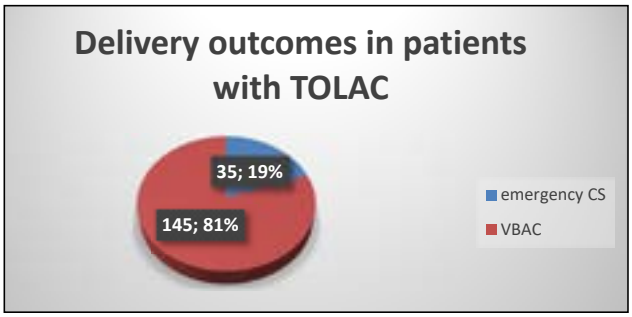

Figure 2 – Delivery outcomes in patients with TOLAC

Further we analyzed number of parity, maternal age, gestational age, inter delivery interval and indications for CS in patients with unsuccessful TOLAC (Tables 1-4).

The number of parity of women with repeat emergencies CS is presented in table 1. It showed that out of 35 women 77.1% of them had 1 to 2 parity and 8.5% of them had 3 to 4 parity, the median of parity was 1.9 ± 1.7 ranged between 1and 7.

Table 1 – Number of parity of women with repeat emergency CS

Parity	Number	Percent	mean ±SD
1-2	27	77,1	1.9±1.7 max/ min (1 – 7)
3-4	3	8,5	
5-7	5	14,2	
total	35	100	

We found that most cases (43%) of unsuccessful TOLAC were seen in women between 25 to 29 years old with mean age of 26.43 ± 5.6, while the other two categories were proportional to the failure rate (table 2).

Table 2 – Maternal age of women with repeat emergency CS

Age	Number	Percent	mean ±SD
20-24	10	28,5	
25-29	15	43,0	26.43 ± 5.6
30-35	10	28,5	
total	35	100	

It was found that gestational age of 3% of women was less than 37 weeks (36w+2day) and in 62,8% of women – between 37 to 39 weeks with mean of 38.9 ±1.3 ranging from 37 to 42 weeks (table 3).

Table 3 – Gestational age (week) of women with repeat emergency CS

Gestational age	Number	Percent	mean ±SD
<37	1	3,0	
37-39	22	62,8	38.9 ±1.3 Mix/ min (37-42)
40-42	12	34,2	
total	35	100	

It was found that in women with repeat emergency CS (table 4) inter delivery intervals were between 12-15 months that is 31.42% and, in most patients, (34.28%) their inter delivery interval were between 16-19 months. The VBAC success rate was 79.0% for patients with an inter delivery interval less than 19 (85.5%) months for patients with an interval greater than or equal to 19 months.

Table 4 – Inter delivery interval of women with repeat emergency CS

Inter delivery interval, months	Number	Percent
12-15	11	31,42
16-19	12	34,28
20-23	8	22,85
>24	4	11,42
total	35	100

Table 5 shows that 37% of women were subjected to emergency cesarean due to fetal distress, 25% – due to failure of progress in labour, 23% – cephalopelvic disproportion and 8.5% – due to threatened uterine rupture or tenderness of uterine scar.

Table 5 – Indication to emergency CS

Indication	Number	Percent
Fetal distress	13	37,1
Failure of labour progress	9	25,7
Cephalopelvic disproportion	8	23,0
Threaten rupture of uterus	3	8,5
Abruption of placenta	2	5,7
total	35	100

Discussion

In our study emergency cesarean rate of 19% is consistent with overall VBAC failure rates reported irrespective of birth order [4, 6]. Failure rates in our group are close to but slightly higher than reported in a study from Samantha S Mooney, in Australia with 395 women admitted with the TOLAC plan 17% [3].

In a study conducted by Saima Aziz in a Pakistani hospital with 122 TOLAC-eligible women, the repeat emergency cesarean rate was 27.9% and the successful VBAC rate was 72.1% [2]. There is some difference in our studies which may have been due to differences in health facilities services, antenatal care or some eligible criteria for emergency cesarian or failure rate of TOLAC.

A Study conducted by Zhonghua at a hospital in Western China (2005) demonstrated the prevalence of repeat emergency cesarian to be 27.8% and the success rate was 72.2% [1]. This study is similar with the Saima study in Pakistan but our study showed such difference in part. The possible reasons are the differences in the selection of eligible vaginal births after cesarean section, indications to previous cesarean sections, anatomical differences between women and their ages and applying different guidelines in this regard.

In our study most (65,7%) women who underwent repeat emergency cesarian had inter delivery period less than 20 months (34.28% cases between 16-19 months and 31.42% – between 12-15 months).

The finding by Huang WH, Nakashima, revealed that unsuccess rate of TOLAC or emergency repeat cesarean was 21% for patients with an inter delivery interval less than 19 months but 14.5% with patients with an interval delivery interval more than or equal to 19 months [15]. Their interpretation is likely similar to each other because short inter delivery interval was negative predictor and decreased rate of success TOLAC but their percentage is different due to access in child spacing services, women education and awareness, number of pregnancies, refusing or accepting TOLAC by a woman.

In our study the mean age of women was 26.43±5.4 years and in 43% of cases the age ranged between 25-29 years. In a study conducted by Nighat Shahin et al. 28.4% reported a failure rate of TOLAC, but maternal mean age was found as 27.1± 3.3 [5]. The prevalence of vaginal birth failure showed differences in our study but mean age of women in failed of TOLAC group reported similar findings.

The study, conducted in a Pakistan hospital by Saima Aziz Siddiqui, reported a mean maternal age of 26.68 ± 4.0 years, and also the result of this study showed highest TOLAC failure rate of 68.9% between the ages of 20-29 years and 5.7% between the ages of 35-39 years [2]. These studies were likely similar to each other because both studies have been conducted in societies with almost the same culture, customs and traditions.

In addition, in a study conducted in a Chinese hospital, the mean age of women was 34±0.9 years and the gestational age mean was 39.6 ±1.3 in TOLAC women who did not succeed [1, 4]. The mentioned study is not statistically similar to our study because the difference is in the culture and age of marriage, pregnancy, child spacing, and health facilities services.

Saima Aziz concluded that VBAC is likely to be unsuccessful at ≥40 gestational weeks (26.47%) with mean gestational age of 38.5±1.28 [2]. We compared it with the highest rate of vaginal birth failure 63% at 37-39 weeks and 38.94±1.3 mean age of gestation in the present reported study.

Samantha et al. reports that in the study conducted in Australia, the highest rate of unsuccessful TOLAC and emergency cesarean sections in 39 weeks pregnancy ranged between 40 and37 weeks , it is likely similar [3].

In addition, the study conducted by Sakiyeva et al. at medical university in Kazakhstan, number of women admitted in labor with gestational >40 weeks was significantly high in unsuccessful VBAC group, this is twice higher for TOLAC failure [9].

Coassolo *et al.* reported 31.3% of VBAC failure at 40 gestational weeks or beyond against 22% in <40 gestational weeks [7, 9]. The findings of these studies are different to our study, due to health facilities services, antenatal care, maternal body anatomic characteristic.

Similarly, Smith et al. in their study on TOLAC, in women at or beyond 40, reported increasing adjusted odds from 40 weeks up to 42 weeks. Another study of 4,086 first-time laboring mothers showed increased risk of cesarean beyond 39 weeks gestation [9].

In our study, 77% of women with unsuccessful TOLAC showed parity being 1-2 with an average 0f 1.9 ±1.07.

Cahill et al, reported in two groups in 2006, that uterine rupture in the prior cesarean delivery group (0.6%) was statistically significant [8]. Risk of uterine rupture was associated with an inter delivery interval ranging between 18 and 24 months [16]. But in our study, no uterine rupture was found.

In our study, the cause of TOLAC failure was 37.1% due to fetal distress, 25.7 percent due to fail of progress in labour, 23 % due to cephalopelvic disproportion and 8.5% threatened uterine rupture and scar tenderness.

According to Lydon et al the repeat emergency cesarean section was indicated in case of failure to progress as the most common indication (60.1%). Fetal indications were 24.4% fetal asphyxia, and 8% cephalopelvic disproportion [10].

The study, conducted in a Brazilian hospital between 2010 and 2011 with 260 eligible women, found that 40.5 % were due to fail of progress, 26.1 % – fetal distress, 16.7 % – CPD and 6.7 % – thick meconium as the reason of failed TOLAC [11].

Singh N, Tripathi, evaluated failure of TOLAC in a hospital in northern India, it was found that 48% of fetal distress, 6% of cephalopelvic disproportion and 11% tenderness of scar in women caused TOLAC failure, with performance of urgent cesarean section [8, 12].

Saima Aziz had earlier concluded in their study that 67% of cesarean sections were performed due to failure of progress [5]. But in the study conducted by Lydon MBr, 27% of failure of progress, 48% fetal distress and 0.8% due to uterine dehiscence were indication for emergency caesarian [10]. These studies reported different statistics to our study.

High body mass index, no previous spontaneous delivery, and fetal distress as a cesarean indication correlated negatively with a successful vaginal birth after cesarean [17]. Past obstetric history, such as stillbirth, history of trial of labor after primary cesarean section, and prior vaginal birth, were significant predictors for successful vaginal birth after cesarean section [18].

It should be noted that in Afghanistan, no previous study has been conducted to provide figures and evidence on repeat emergency CS. By launching this study, we were able to obtain usable figures and evidence and pave the way for further analytical research. Our study is based upon regular medical records and data from two maternity hospitals.

Conclusion

Frequency of repeat emergency cesarean was found in women with prior CS as 19.4%, short inter delivery interval was found to cause an increased rate of repeat cesarean, fetal distress was the most indication of repeat emergencies cesarean. Further study is needed to identify what clinicians anticipate and how they make decisions about childbirth after a previous cesarean delivery within the context of actual antepartum care. Appropriate selection of patients for trial of labor after caesarian section must reduce failure of TOLAC.

Decrease the associated morbidity by reducing repeat emergency cesarean especially in low resource settings.

Provide different methods of contraception for women with prior CS.

Awareness and counseling about the child spacing and inter delivery interval as a factor that affects mode of delivery in women with prior cesarean delivery.

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FLUCTUATIONS OF LEFT VENTRICULAR LVEF IN IHD PATIENTS

Ischemic heart disease (IHD) is the world's major cause of death. It presents clinically as myocardial infarction and ischemic cardiomyopathy and is also known as coronary artery disease. To define LVEF percentage in CAD patients. This cross-sectional study was done retrospectively by collecting data from the database of "Scientific Research Institute of Cardiology and Internal Diseases" Almaty, Kazakhstan during 2020. IHD was confirmed in clinical, angiographic and other lab findings with TTE used for detection of LVEF. A sequential non-random sampling technique used SPSS for statistical analysis. Conventional echocardiography showed that there were significant differences in LVEF percentage in patients based on age and gender. The number of female and male patients who have preserved LVEF was 66.4% and 54.7% accordingly, 21.6% of females and 22.1% of males had Mid-range LVEF and 12.1% of females and 23.3% of males had decreased LVEF (P-value = 0.001). The mean of LVEF was (55.8% ±11.79). Maximum and minimum of EF were 84%, 12% respectively. We discovered that EF was moderately lower in male patients than in females in the sample. When compared to patients without a history of IHD, those with IHD history showed more significant EF deterioration. IHD patients with low EF appeared to be at high risk of Hypertension and infarction with decreased HDLc.

Key words: LVEF, Comorbidities, IHD, Myocardial.

Introduction

Ischemic heart disease is a medical condition that occurs when blood flow to the heart muscle is reduced or when oxygen demand increases (mismatch between demand and supply of oxygen). The most prevalent predisposing factors include coronary artery atherosclerosis (CAD), epicardial artery spasm, or pathological changes in the microvascular system. CHD is caused by a chronic condition that worsens over time or by sudden changes in atherosclerotic plaque (erosion, rupture, hemorrhage, and fissure). CCS was first established in ECS rules in previous American recommendations in 2019 [1].

ACS encompasses unstable angina pectoris and acute myocardial infarction, which is further split into ST-segment elevation myocardial infarction (STEMI) and non-ST segment elevation myocardial infarction (non-ST segment elevation myocardial infarction) (NSTEMI). Cardiovascular diseases are still the top cause of death [1]. In the United States, 30 percent of all deaths occur in people over the age of 35 [2]. CAD is responsible for more than 1.7 million fatalities in European countries [3]. The highest mortality rate due to CAD is observed in non-European nations, while the lowest rate is found in 15 European countries [3]. When anterior and nonanterior infarcts are compared, anterior infarcts are linked to higher enzymatic infarct size and poorer LVEF [4]. Left ventricular (LV) dysfunction in the days to months following an acute myocardial infarction (MI) is used to identify patients at higher risk of sudden cardiac arrest (SCA) and mortality [5]. Baseline left ventricular EF (EF) is also an independent predictor of MI survival at the time of initial percutaneous coronary intervention [6].

In the treatment of patients with cardiovascular disease, an accurate measurement of LVEF is crucial. LVEF has a predictive value in predicting adverse outcomes in patients with congestive heart failure, following a myocardial infarction, and after revascularization [7,8]. Up to an LVEF of 45 percent higher LVEFs were associated with a linear decrease in mortality in heart failure patients. Increases above 45 percent, on the other hand, were not associated with further reductions in mortality. Although LVEF is a strong independent predictor of death in individuals with heart failure, its prognostic relevance must be weighed against other known risk factors. Current American College of Cardiology/American Heart Association guidelines recommend regularly testing LVEF in heart failure patients to guide therapy, but they do not specify a relationship between LVEF and prognosis [9,10].

*Justification of the choice of articles and goals and objective***s**

Aim: To assess LVEF percentage in IHD patients.

Objectives:

- To study the decline in LVEF based on the sex of patients.

- To find the correlation of LVEF decline with other comorbidity diseases.
- To find differences in LVEF based on age.

Materials and Methods

This is a descriptive retrospective cross-sectional study of 649 IHD registered patients in "Scientific Research Institute of Cardiology and Internal Diseases" Almaty, Kazakhstan during 2020. A consecutive non-random sampling was used to include all patients with IHD. LVEF was compared in patients of different age, sex, with different history of HTN, BMI, DM, and previous IHD. Patients were excluded if they had been discharged from the emergency room, leaving the hospital early and without making an echocardiography report. Statistical analysis is made based on IBM SPSS statistics 22 and Excel. Chi squire test is used to compare categorical variables and P-value <0.05 was considered significant. Independent T-test performed with 95% CI to compare scale variable with categorical variable. One sample T-test with 95% CI was used to compare the mean of LVEF in our study with the average of LVEF in other publications. Data are presented showing the number of patients or mean± SD.

Results and Discussion

The study includes 649 valid patients. According to risk factors, arterial hypertension was detected in more than 90% of patients, almost a third of patients had diabetes mellitus (31.5%) and high cholesterol (31.3%), more than 85% were overweight, and 93.5% of patients do not drink alcohol, family anamnesis of CVD was confirmed in 13.4% only, which in average of IHD patients was (64.2 ± 9.24). Average age in males (63±9) and females (66±6), and statistical analysis with independent T-test shows relation between age and gender group P < 0,001 (95% CI, –4.441: -1.29) (Table 1).

Table 1 – General characteristics of the study sample

Variables	Female		Male		Test of differences		
Number / Percent	N	%	N	%	$\chi 2$	DF	P value
Age Category (Year)							
<40	3	1.30%	4	1.00%	19.919	5	0.001
>80	15	6.50%	15	3.60%			
40 – 49	6	2.60%	27	6.50%			
50 – 59	44	19.00%	98	23.50%			
60 – 69	87	37.50%	187	44.80%			
70 – 79	77	33.20%	86	20.60%			
Family History							
No	201	86.60%	372	89.20%	0.953	1	0.329
Yes	31	13.40%	45	10.80%			
Previous IHD							
No	161	69.40%	210	50.40%	22.062	1	0.000
Yes	71	30.60%	207	49.60%			
Hypertension							
No	22	9.50%	60	14.40%	3.25	1	0.071
Yes	210	90.50%	357	85.60%			
Diabetes Mellitus							
No	159	68.50%	308	73.90%	2.096	1	0.148
Yes	73	31.50%	109	26.10%			
Alcohol							

Table continuation

Variables	Female		Male		Test of differences		
Number / Percent	N	%	N	%	χ2	DF	P value
No	217	93.50%	388	93.00%	0.056	1	0.812
BMI Category							
Underweight	0	0.00%	1	0.20%	4.486	5	0.486
Normal	50	21.60%	96	23.00%			
Over weight	93	40.10%	190	45.60%			
Obese -1	59	25.40%	89	21.30%			
Obese -2	23	9.90%	29	7.00%			
Obese -3	7	3.00%	12	2.90%			
Total Cholesterol							
Optimal	161	69.70%	303	73.00%	1.657	2	0.437
Intermediate	39	16.90%	70	16.90%			
High	31	13.40%	42	10.10%			
LVEF Category							
Preserved EF	154	66.4%	228	54.7%	13.18	2	0.001
Mid-Range EF	50	21.6%	92	22.1%			
Decreased	28	12.1%	97	23.3%			

Preserved LVEF was observed in 71.40% of patients under 40 years old, 28.6% of patients in the same category had a decreased LVEF.

Data in patients over 80 y. o. show that 50% of them had a preserved LVEF, 10% had mid-range LVEF and 40 % had a decreased LVEF.

Among patients between 40 – 49 years old 54.5% had a preserved LVEF, 18.2% had mid-range LVEF, 27.3% had a decreased LVEF.

In the category 50 – 59 years ago 59.9% of patients had a preserved LVEF, 22.5% had mid-range and 17.6% had a decreased LVEF.

In patients between 60 and 69 years old 55.5% of them showed preserved LVEF, 25.2% – mid-range LVEF, and 19.3% decreased- decreased LVEF (P = 0.055) (Table 2).

When we assess data, we found some differences of EF category with gender category. In female; 66.4% of female had preserved LVEF ,21.6% had mid-range LVEF,12.1% had a decreased LVEF. In male; 54.7% of patients had preserved LVEF, 22.1% had mid-range LVEF, 23.3% had a decreased LVEF (Table 3, Figure 1).

Some differences were seen in LVEF in patients with history of IHD; 43.5% of them with preserved LVEF, 28.4% with mid-range LVEF, and 28.1% with decreased LVEF. (P= 0,000). (Table 4, Figure 2).

Table 2 – Correlation of EF category with the category of age

LVEF	<40		>80		40 – 49		50 – 59		60 – 69		70 – 79		Test of Differences	
	N	%	N	%	N	%	N	%	N	%	N	%	Chi square	PV
Preserved EF	5	71.4	15	50.0	18	54.5	85	59.9	152	55.5	107	65.6	18	0.055
Mid-Range EF	0	0.0	3	10.0	6	18.2	32	22.5	69	25.2	32	19.6		
Decreased EF	2	28.6	12	40.0	9	27.3	25	17.6	53	19.3	24	14.7		

Table 3 – Effect of gender on LVEF

		Female		Male		Test Differences	
		N	%	N	%	Chi – square	PV
LVEF	Preserved	154	66.4%	228	54.7%	13.18	0.001
	Mid-Range	50	21.6%	92	22.1%		
	Reduced	28	12.1%	97	23.3%		

Figure 1 – Correlation of EF category with the category of age

Table 4 – LVEF fluctuations in patients with history of IHD

	Previous IHD					
	No		Yes		Test of Differences	
	N	%	N	%	X^2	PV
Preserved EF	261	70.4%	121	43.5%	48.46	0.000
Mid-Range EF	63	17.0%	79	28.4%		
Decreased EF	47	12.7%	78	28.1%		

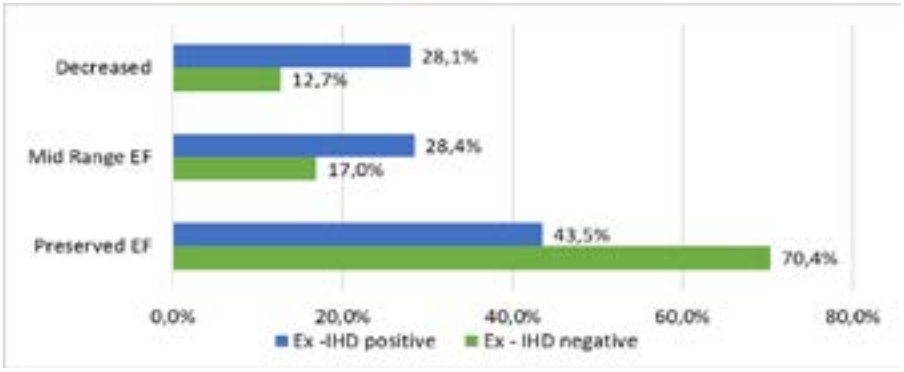

Figure 2 – LVEF fluctuations in patients with IHD history

***Note**: EF classification in two systems:*

Decreased EF < 40%; Midrange EF = 40 – 49%; Preserved EF = 40 -49%, Normal≥50%

Normal = 55 -75%; Mild decrease =45 -54%; Mild decrease = 30 -44%; Severe LVEF decrease <30%; High EF>75%

Ischemic heart disease (IHD) is a main contributing pathogenic factor in HF, with an 8-fold increased risk of HF and a population-attributable risk of 65 % in men and 48 % in women [11]. The influence of IHD on HF and its subtypes is changing due to an aging population and increasingly successful treatment of acute coronary syndrome, which results in less severe myocardial damage and chronic remodeling. Recent evidence pointing to a temporal change in the mix of types of HF post-IHD cases, favoring HFmrEF and HFpEF over HFrEF, further emphasized this argument[12]. In our study average age of patients with decreased EF was 63.35±10 and average LVEF constituted 32.96±5.6. Average age of patients with mid-range EF was 63.9±9 and average LVEF – 44.67±2.78. Average age of patients with preserved EF was 64.4±9.17 with average LVEF being 61.74±6.82. A study performed by Vedin et al in 2017 including 14,277 IHD patients with decreased EF showed that of the average age was 76 years (P <0.001). In second group they observed 5,600 IHD patients with mid range EF,and found that the the average age was 77 years old (P <0.001). In third group they evaluated 5,222 IHD patients with preserved EF , and the average age in this group was 80 years old (P <0.001) [13].

The age of patients in a study performed by Elsman et al in 2006 showed that the age ranged between (60±12) years old in non-LAD and 59±11 years old in LAD patients. Overall average age made up 59.5 years old. In 9% of patients with non- LAD and 7% of patients with LAD DM influence the level of LVEF, in addition HTN was present in 22% of patients with non-LAD and 21% of patients with LAD suffered myocardial infarction[14].

In comparison with Vedin et al there were differences in ages, the reasons could be due to lack of knowledge about heart diseases, life style variations (heavy meal, sedentary life, impact of comorbidities, but there was no any difference between mean age in our study and the study of Elsman et al.

In our study mean LVEF was 55.8±11.8 with normal distribution, while in another study performed by Elsman et al in 2006 they compare mean LVEF in IHD (MI) patients with LAD (432) and non- LAD (456). LVEF one week after infarct in LAD group was 39% (28 -50), and in infarct with non-LAD was 49 % (41 – 57), and average LVEF in this study was 44 % (P<0.001), [14].

In a prospective study done by Chew et al in 2018 MI patients were assessed in three categories (no recovery, moderate increase in LVEF, significant increase in LVEF). [5]. In the first group they assessed 77 patients with baseline LVEF being 40 (36, 44) at the time of attack, in eight weeks again they evaluated LVEF and observed a decline in percentage of LVEF -2(-7,0), (P =0.3). In the second group a researcher evaluated 83 MI patients, in eight weeks they showed moderate increase in LVEF (Baseline LVEF 40 (38 ,45)), (P =0.3), and in eight weeks they found some significant positive signs of better outcome (7(4, 9)). In the third group they evaluated 88 MI patients with baseline LVEF 40 (35 , 43) (P =0.3), and assessment in eight weeks showed increase in LVEF (19 (15 ,24)) [5].

LVEF measurements in our study include all patients with ACS, chronic stable angina, variant angina, however we exclude number patients who had serious and fatal health status and died in hospital. There were no cases strenuous comorbidity diseases that significantly declined LVEF. One important risk factor for IHD and its complication is male gender which in our study is 64.3%, less than in a compared study (LAD group 83%, non – LAD 73%).

In a study done by Xing et al in 2020 they evaluated LVEF in patients with obstructive CAD, Coronary microvascular dysfunction (CMD) and in a control group; in obstructive CAD the LVEF was 70±4.2 , in CMD patients it was 70.6±4.7 and in the control group it was 71.1±4.7 (P =0.509) [15]. Professional cardiologist, equipped medical center, giving preventive information for citizens, following physicians' recommendations, and life style modifications were the reasons for good LVEF in this study.

Conclusion

In the performed study we found that EF moderately decreased in male patients than females. EF declined more moderately in patients with previous history of IHD in comparison to patients with no history of IHD. Hypertension and decreased HDLc were considered as significant risk factors in IHD patents with decreased EF.

Public awareness about cardiovascular diseases is the key for better results: Comorbidities such as HTN, DM, obesity, hyperlipidemia, and other risk factors should be early diagnosed and treated. Screening test should be performed in IHD patients' families for early detection of possible IHD.

1-There were significant differences in LVEF decline in both genders (p = 0.009).

2-Significant differences were seen in LVEF decline in patients with history of IHD. ($p < 0.001$), but very weak or no association was present between decline of LVEF and other comorbidities.

3-There were not seen any significant differences in declined LVEF in category of age.

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Section 2
Health care

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THE PRACTICAL ISSUES BEHIND THE USE OF SOCIAL TECHNOLOGIES FOR THE IMPROVEMENT OF THE QUALITY OF LIFE OF ELDERLY PEOPLE IN THE CITY OF ALMATY

Increasing amount of retired people represents one of the main challenges in social policy in the city of Almaty. Akimat developed and introduced a roadmap "Active Ageing" as a part of "The year of aged people support', which underlined opening the first and a pilot center for retired people. Public Fund "Kumis Khasyr" developed and introduced a multidisciplairy program for the provision of a range of social services such as medical, social, pedagogical, educational, cultural.Under this program, 9,139 retired people were covered. Moreover, according to feedback 68% considered the overall organization good, 23% considered very good. Proper analysis on the needs showed that the main problems of the retirement age are social isolation, poor health, ageism, computer illiteracy, age-associated psycho-emotional disturbances such as anhedonia, depression, constantly emerging anxiety, panic attacks, as well as an extremely low level of cultural behavior. All of the above problems strongly suggest that there is a need to improve the policy of supporting an elderly person in the city of Almaty.

Key words: social policy, the needs of the pensioner, active longevity.

Introduction

According to the 2001 United Nations Report "World Population 1950-2050", by 2050 the number of older people in the world will reach the number of young people, a trend that has been observed in developed countries since 1998 [1]. In 1950, the proportion of older people was 8%, in 200 10%, in 2012 11% and it is predicted that by 2050 it will reach 22% or 2 billion people [1]. Moreover, the proportion of people aged 80 will increase from 14% in 2012 to 20% in 2050 [1]. 221.7 thousand elderly people live in the city of Almaty, of which: women – 158.1 thousand, men – 63.6 thousand [2]. Pensioners over 75 years old – 57.4 thousand people, participants in the Second World War – 291 people, invalids of the Second World War – 117 people [3]. In the Republic of Kazakhstan, the state program "Densaulyk" for 2016-2019 was developed, the main goal of which is to increase the average life expectancy of the population of Kazakhstan up to 73 years by 2020 [4]. Under these conditions, policy to increase the duration of the "active old age" phase and increase the role of older people in public life becomes significant [5, 6].

The Akimat of Almaty city developed and implemented the Active Ageing Road Map, within which the first pilot center, the so-called Active Ageing Center, was opened [7, 8]. Public Fund "Kumis Khasyr" has developed a program of a multidisciplinary approach, taking into account the recommendations of the UN International Madrid Plan [9,10]. it is well-known that a change in social status associated with the termination or restriction of labor and social activities, lifestyle and communication, the emergence of difficulties in the social sphere and the need for psychological adaptation to new conditions, gives rise to serious problems in the elderly, such as depression [11], anhedonia [12], deviant behavior

[13]. After retirement, the older generation has a lack of communication, the loss of active social ties, while educational needs in most cases do not decrease, and sometimes increase [14,15]. Based on this, there is a need to develope a system of educational and socio-cultural rehabilitation of elderly citizens through the preservation and development of their physical, creative, intellectual potential, which makes it possible to provide the elderly with psychological support, to give the opportunity to feel needed and interesting to other people [16,17, 18]. Social support for the older generation is one of the leading directions for increasing life expectancy, and hence dealing with socio-demographic problems [19].

One of the topical issues today is the availability and quality of social services for the older generation of Almaty. A sufficient number of elderly people over 60 years old live in Almaty, so it is important to organize places for spending their leisure time.

Thus, the creation of an infrastructure for systematic cultural and leisure work aimed at improving the quality of life of the citizens of the older generation of Almaty, promoting their involvement in active intellectual, creative, social activities and the continuity of generations is one of the most relevant constructs in the policy of supporting the elderly population of our cities. The program of the first "Center for Active Ageing " within the framework of the Roadmap "Active Ageing" is actively scaled throughout the Republic of Kazakhstan. The Kumis Khasyr Public Foundation, in turn, has developed a comprehensive program of a multidisciplinary approach to the provision of a range of social services, such as medical, psychological, household, economic, labor, leisure and pedagogical services for people over 60 years of age, as well as their families.

Taking into account the foregoing, at the planning stage, we developed programs for the provision of medical and social, psychological, social and household activities for the elderly who have retained the ability to self-service and active movement on the basis of the Center, such as:

1.Organization of social and cultural leisure and daily accessible communication, training, as well as the continuity of generations,

2. Implementation of educational, socially significant initiatives and cultural programs aimed at supporting an active lifestyle of the elderly in the conditions of a day stay at the Active Aging Center;

3. Involvement of citizens of the older generation in active social and public activities;

4. Development of social partnership in the field of organizing support for older citizens;

5. Promotion of initiatives and projects in the field of educational and social support for older citizens.

6. Maintaining and strengthening the health of citizens through a set of recreational activities of a non-pharmacological nature;

7. Organization of consultations of medical workers and implementation of measures to correct the psychological status (psychologist, psychotherapist);

8. Involvement of government institutions and enterprises, civil sector and business environment in the conduct of events

All of the above services were organized and provided by the Multidisciplinary Team of the Public Foundation "Kumis Khasyr" (doctor, nurse, psychologist, social worker, lawyer, etc.) in cooperation with the regional departments of labor and social protection of Almaty, state and non-state institutions.

Material and Methods

In order to obtain reliable statistical data, we introduced "The need map" based on Excel database. All the attendees register at the database in order to obtain the services. Moreover, as the project is akimat –paid therefore, the personal data of the pensioners is protected by the government IT-systems.

In order to evaluate the quality of the services provided we developed our questionnaires, therefore, we monitor the quality. Moreover, there are regular personal meetings that also provide information on the quality of the service.

As we used descriptive results, therefore, we used Excel datasheet for the tables. All participants signed a written consent on the feedback results publication.

Results and Discussion

As can be seen from Figure 1, a total of 10,940 people were covered with the services such as smartphone; 7,570 people were covered by the School of Computer Literacy. In addition, 7740 people took Kazakh language courses and 8460 people took English language courses lasting 2 months.

As can be seen from Figure 2, 1400 people were covered as part of the provision of socio-economic services, of which 250 received individual consultations, 1150 attended lectures on various topics, such as "Employment Agreement", "Pension Benefits", "Rights of the Elderly in the Republic of Kazakhstan", legal advice and benefits provided by the legislation of the Republic of Kazakhstan for the elderly

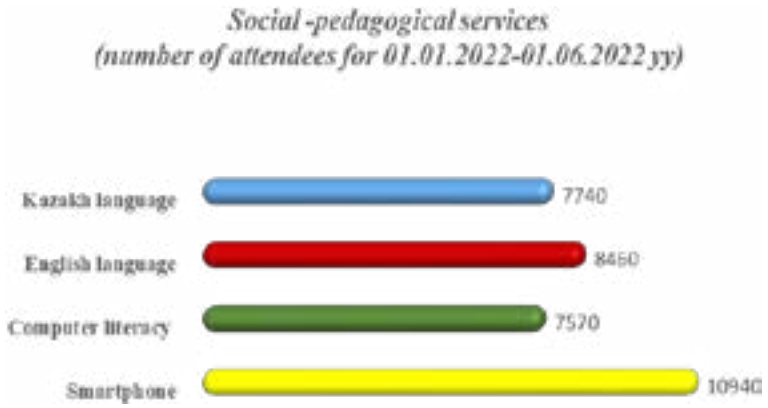

Figure 1 – The number of service recipients covered by the CAA
for social and educational services for the period 01/01/2022-06/01/2022

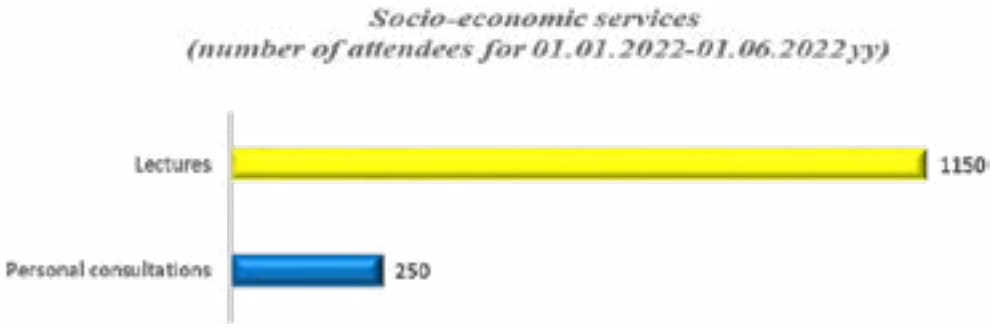

Figure 2 – The number of covered service recipients of the CA
C by socio-economic services for the period 01/01/2022-01/01/2022

Social and psychological services, including psychotherapeutic trainings, individual psychological consultations, group and individual trainings for service recipients: “Antistress”, “Art therapy”, “My years are my wealth”, “My Family”, “Modern Society and Age” as well as individual consultations of a psychologist “First psychodiagnostics”, “Schulte tables”, Fibonacci technics “20” Mnemonics “Anti-stress”, “Color therapy”, “Prevention of anhedonia and depression”

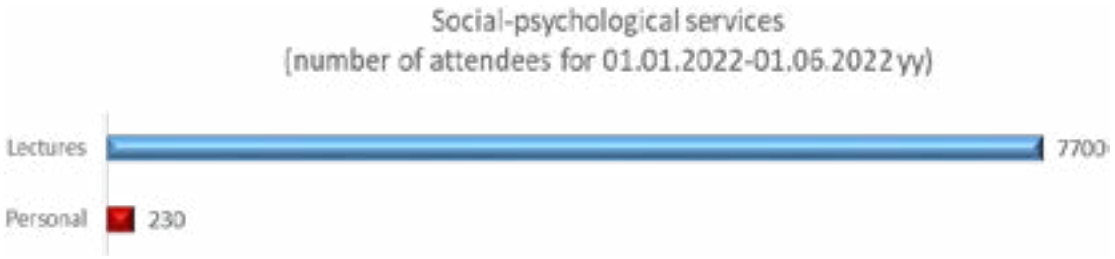

Figure 3 – The number of service recipients covered by the CAP
for socio-psychological services for the period 01/01/2022-06/01/2022

As can be seen from Figure 3, during the above period, 7930 visits were covered, of which 7700 attended group trainings, 230 individual trainings.

As can be seen from Figure 4, 2,200 people were covered by social and labor services. In addition, it is worth noting the interest in potential employment among people of retirement age.

Socio-cultural services, for example, the “Link of Generations” program, are educational and intellectual services based on Mentoring /

Mentoring by transferring professional knowledge and skills from an experienced specialist (Mentor / Mentor) to schoolchildren. "School of leaders" for the development of curiosity; intelligence, creative imagination; developing the ability to communicate with adults and peers; development of communication skills, attention and memory. "Chess Kings" – holding tournaments for those who want to learn and play, thematic events "Let's Get Acquainted with a Cup of Tea", "Our Anniversaries", "Let's Get Married", "Almaty is my first love", etc. Excursion trips around the city of Almaty, as well as "Days of World Cinema", "Modern Literature and Art".

Figure 4 – The number of service recipients covered by the CAP for socio-psychological services for the period 01/01/2022-06/01/2022

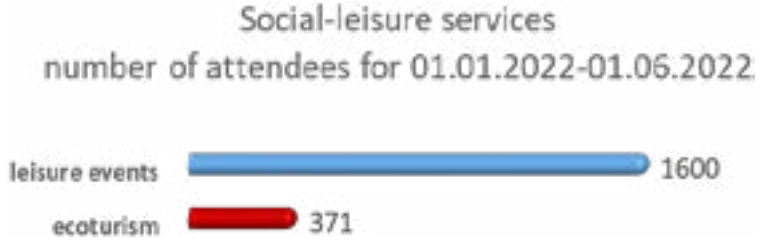

Figure 5 – The number of service recipients covered by the CAC for socio-cultural services for the period 01/01/2022-01/01/2022

As can be seen from Figure 5, during the above period, 1971 visits were noted, of which 371 people had the opportunity to go on sightseeing trips around the city of Almaty, organized jointly with the Department of Tourism and External Relations of the city of Almaty. 1,600 people took part in thematic events indicated in the block of the program on social and leisure services. In addition, within the framework of the "Connection of Generations", relay races, thematic competitions "Come on grandmothers" were organized together with secondary school No. 173, the children's ethno-folklore ensemble "Masis", "Araxs". Social and medical services include several blocks, for example, the program "Healthy Lifestyle of the Elder", which involves work aimed at improving the health and prolonging the active longevity of the elderly using the method of adaptive physical therapy, Nordic walking; conducting a course of lectures selected by doctors, taking into account age-related changes, a course of lectures aimed at promoting a healthy lifestyle, raising awareness of the body's reserve capabilities and their use, increasing the body's resistance to stressful situations and their removal, consulting a medical worker within the provision of first aid . Health promotion conducting health-improving non-drug measures (adapted exercise therapy, blood pressure control, diet, etc.)

Blocks:

- "Secrets" of longevity.
- Adaptive Therapeutic physical culture at home.
- The impact of physical activity on the elderly.
- Mediterranean diet for longevity
- Adaptive rehabilitation
- Therapeutic yoga
- Nordic walking
- Terrencourt
- Choreography and dance

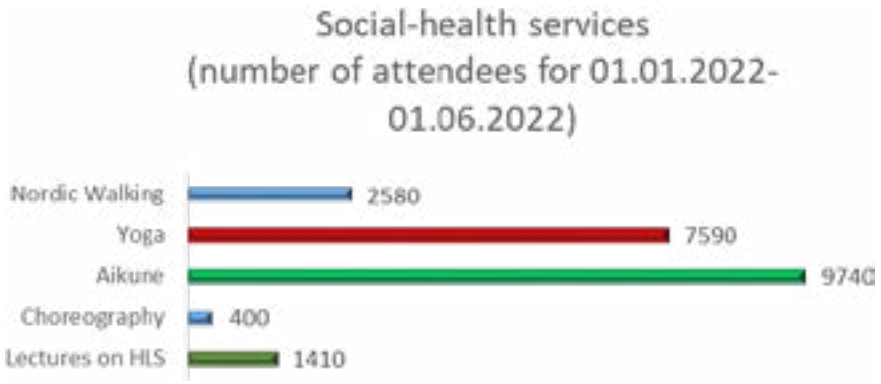

Figure 6 – The number of service recipients covered by the CAP for social and medical services for the period 01/01/2022-06/01/2022

As can be seen from Figure 6, 2580 visits were noted for Nordic walking, 7590 for therapeutic yoga, 9740 for aikune. As can be seen from Figure 6, exercise therapy turned out to be among the least demanded programs, however, according to preliminary analysis, exercise therapy was one of the least demanded among service recipients, as a result, the program underwent changes, such as the introduction of more hours of Nordic walking instead of exercise therapy. In addition, it is worth noting that the simulators also did not enjoy interest, while group physical training was the most relevant. CAA service recipients note that group classes brought higher efficiency, as they feel more confident and better in the group. Thus, 9,139 visits by people of retirement age were covered during the period (Table 1).

Table 1 – Total coverage and number of visits to the CAA for the period 01.01.2022-01.06.2022

Month/event	Total	January	February	March	April	May
social and health services:	32600	9600	9440	5390	4355	3815
nordic walking	2580	450	450	480	600	600
Healing Fitness						
Yoga	7590	2500	2460	1130	900	600
Consultations, master classes on recovery	7470	2400	3680	1120	135	135
Aikune	9740	2500	2500	1700	1600	1440
Choreography	5220	1750	350	960	1120	1040
Educational services	36120	11350	10310	4300	5490	4670
Computer literacy	7570	2200	1500	1300	1450	1120
Smartphone and applications	10940	4000	3600	700	1440	1200
English language	8460	2500	2340	980	1440	1200
Kazakh language	7340	2400	2320	860	960	800
Trainings	1810	250	550	460	200	350
Socio-psychological services	23470	4600	6645	5105	4200	2920
Group psychological training «Ambulance»	15540	3450	5490	2760	2560	1280
Group psychological training «Antistress»	7700	1100	1100	2300	1600	1600
Individual psychological services	230	50	55	45	40	40
Socio-leisure services	1971	345	250	280	546	550
Socio-law	318	50	78	70	55	65
Socio-labor services	2200	450	550	600	240	360
Socio-economic services	1400	150	300	350	250	350
Total registered number of people	3500					
Number of active participants	3280					

In addition, with the important results of this work, this project helped to increase the level of social integration of older people in society; expand the amount of people receiving additional social, educational, leisure, and consulting services. In addition, the foundation was laid for the formation of a civic position and a tolerant attitude towards people of the older generation, different views and beliefs among the younger generation. The attention of the population, social workers, government agencies to the problems of older people was attracted through publications in the media about the progress of the project, and a platform was laid for creating a model of social continuity of generations, spiritual and moral education of the younger generation. It should be emphasized that according to the Madrid Action Plan, lifelong learning is one of the effective levers for improving the quality of life of the elderly [2]. Educational services based on the "Center for Active Ageing" showed that in our Kazakhstani society, meeting the educational needs of pensioners, developing the creative activity of pensioners, creating an information technology training center and organizing courses for training pensioners to work in social networks (Internet) to eliminate computer illiteracy and develop communication skills is one of the most relevant and priority aspects in the policy of improving the quality of life of pensioners.

According to the classical management model, the assessment of the effectiveness and quality of services provided is one of the key points in monitoring work processes.

According to the planned criteria for evaluating the effectiveness of the project implementation, we evaluated the work of the CAA according to the following criteria:

1. Attendance of the Center by the elderly
2. Feedback from the elderly themselves and their relatives
3. Publications in the media

Thus, according to the feedback questionnaire, it was revealed that 68% consider the overall organization to be good, 23% consider it to be very good, but 6% were dissatisfied, as they consider the duration of the programs to be 2 months too short for mastering the program. According to the results of the survey, social and health services, such as lectures on the topic of a Healthy Lifestyle from the cycle "Health of the Aksakal", were noted by 76% as good, only 3% noted as extremely bad. The main reason was the lack of therapeutic programs. In addition, 40% note that socio-economic (lectures, individual consultations) and socio-pedagogical services (English, Kazakh, Latin) were useful, however, the duration of the programs for a month is the main reason for the dissatisfaction of CAA service recipients. In addition, social and labor services, including internal and external occupational therapy, were rated as good by 50% and excellent by 18%, since collective pastime contributes to the active socialization of CAA service recipients.

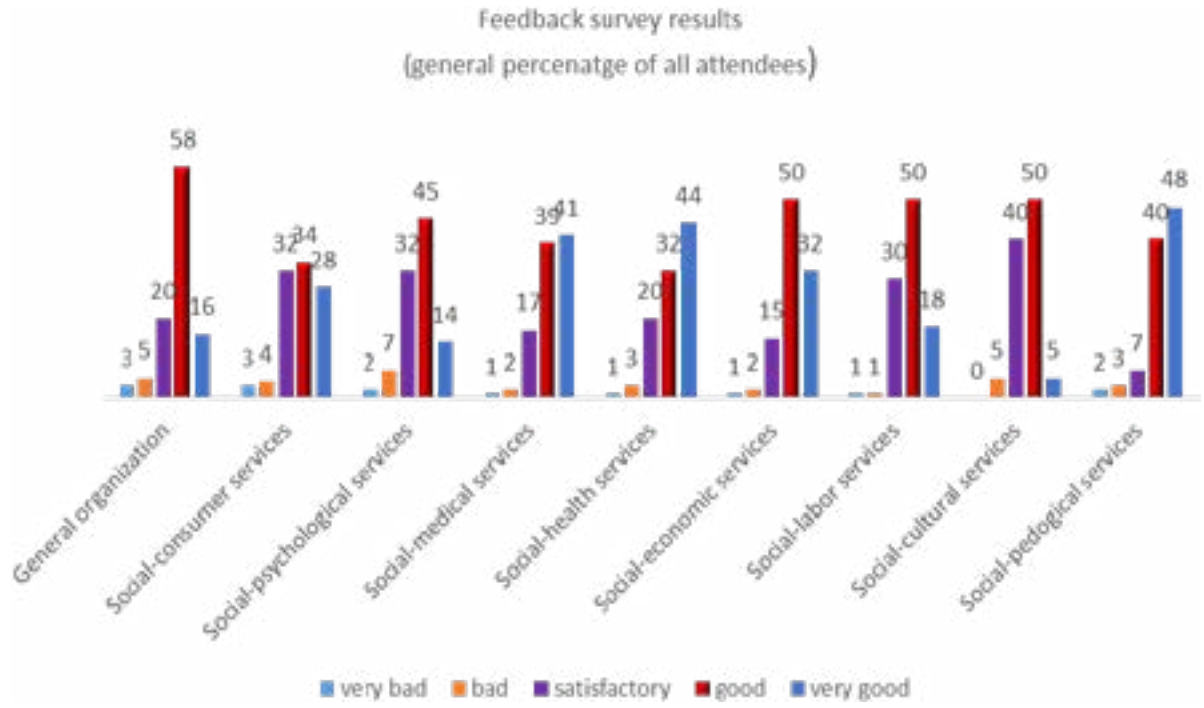

Figure 7 – Reverse questioning on the quality of services provided on the basis of the CAA

In addition, we also conducted a survey on the improvement of general emotional and physical health among CAA service recipients. As can be seen from Figure 7, the majority note a positive trend. As can be seen from Figure 2, 80% and 76% noted an improvement in the psycho-emotional background and an improvement in mobility, respectively. 68% noted an improvement in general health, 52% noted a decrease in pain, in addition, 67% noted the fact that CAA promotes active re-socialization among CAP service recipients Figure 8.

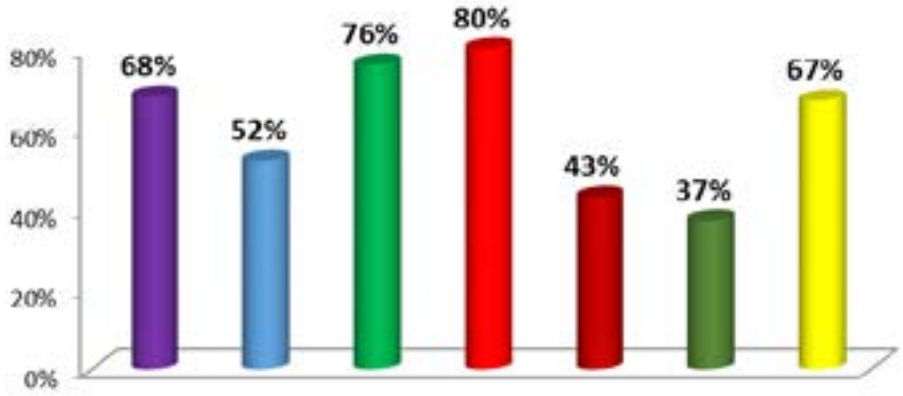

Figure 8 – The results of a survey on general health and psycho-emotional background among CAA service recipients

Conclusion

Thus, a huge number of people who want to visit the "Active Ageing Center", queuing for a record for 2-3 months, an actual visit of 250-330 people (according to the technical specification, 156 people are expected) indicates the relevance and need for such projects in every district of Almaty. Over the past period, 3,500 people were registered on the basis of the CAA and 96,099 visits were covered by services. In addition, it should be noted that a queue has formed for the provision of services for the next year. Among the CAA service recipients were pensioners from all districts of the city of Almaty, even from the most remote ones, such as Nauryzbai, Turksib. The conducted feedback analysis showed that social and living conditions such as the number and capacity of rooms, the total area of 300 km2 cannot satisfy the needs to the maximum extent, this indicates the need to create and open such centers in all districts of the city of Almaty. In addition, the analysis of needs through interviews showed that the main problems of people of retirement age are: social isolation, psychological problems associated with retirement, adaptation to age-related changes, gender inequality, computer illiteracy, problems in the family, ageism, deterioration in physical health a low level of legal and economic literacy, a tendency to psycho-emotional disorders, such as anhedonia, depression, a feeling of constant anxiety, panic attacks, as well as an extremely low level of behavioral culture. All of the above problems indicate the need to improve the policy of supporting the elderly in the city of Almaty.

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GENDER DIFFERENCES IN INTELLIGENCE AMONG THE BACHELOR DEGREE OF DENTISTRY STUDENTS IN KABUL UNIVERSITY OF MEDICAL SCIENCES BASED ON EXAM SCORE: A PROSPECTIVE OBSERVATIONAL STUDY

Education is one of the basic necessities of every person which is accepted by the United Nations as one of the basic rights of the individual male and female. Gender differences in educational achievements have long been the focus of researches. Several studies have reported that female students outperform their male counterparts. The purpose of this study is to identify the percentage of intelligence level between male and female based on their exam score taking. The sample size estimation was created on the consecutive sampling where all cases are accessible in a given period of time. In a cross-sectional study out of a total of 610 students of the Dentistry Department of Kabul University of Medical Sciences which is one of the top public universities in Afghanistan, 278 were males and 332 females. The results of final exams of fall semester 2019 of Dentistry Department have been collected, then the percentage of each class have been calculated separately to find out which gender group is due to be among top ten students in each class. And in addition we have calculated how many students of both gender show above 80 percent. Two Sample T Test and Ms. excel were used for statistical analysis. This research showed that the numbers of Female students are more in top ten than male students in each class of Dentistry Department. We can accomplish that female students are more hardworking compared to male students.

Key words: Gender, Intelligence, Education, Afghanistan, Student, Intelligence quotient.

Introduction

Gender refers to the socially constructed roles, behaviors, expressions and identities of girls, women, boys, men, and gender of diverse people. These differences and their important role in social lives are generally agreed upon and observed by scholars, policy makers, and other stakeholders[1]. Education is one of the basic necessities of every person which is accepted by the United Nations as one of the basic rights of the individual male and female [2]. High quality training and effective content can be challenging to develop for educational programs targeting resource-poor environments. The University Support and Workforce Development Program (USWDP) supported the education system to improve higher education conditions and workforce capacity in Afghanistan from 2013 to 2019[3].

Studies from around the world have reported significant differences in the academic performances of male and female students at various levels. Many studies reported better performance of female students as compared to their male counterparts [4-6]. However, a study conducted among Kenyan secondary schools reported better results among male students compared to females[7]. Few studies did not report any significant difference in academic performance of male and female students[8]. Creating mobility in education among students is one of the methods that urge them to have better score. In order to create more mobility among students, exams are taken from students.

In a country like Afghanistan where patriarchy is still dominant in various aspects of life, gender differences are still clearly evident. The social status of women in Afghanistan is generally low, a situation attributable to both the general poverty of the country and the gender-based distribution of power and resources in the family and in society. Afghan women, in general, have not been able to become active participants in development activities due to illiteracy, poor health, poverty, traditionally conservative attitude towards them and lack of their access to productive resources and information and technology. Discrimination against women begins right from birth. The religious, cultural, traditional beliefs and political scenario promote such discrimination. As a result, wide gender disparity is seen in every sphere of national development.

Afghanistan in many years has been facing with internal wars, political issue, poverty, immigration, ethical and traditional issues. All these can impact women's achievement that many times are ignored due to gender difference, traditional customs, and cultural issues. Education for all has been a good slogan of the government of Afghanistan. Furthermore, expanding opportunities for accessibility of women in education has been one of the objectives of the education sector under different national development plans of Afghanistan. The government of Afghanistan has received grants from various international organizations like United Nations, World Bank, and United States Agency for International Development (USAID) to strengthen gender equality in various aspects of lives of the people across the country. In this context, the government of' Afghanistan, international organizations and NGOs have been concentrating on ensuring complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes for all girls and boys by 2030 as guided by the Sustainable Development Goals[9]. Despite vigorous efforts from the government and non-government sectors to ensure gender equality in education, there is still a serious gap between boys and girls in academic performance and achievement. There are very limited studies focused on the issues of gender differences in academic performance of students. The purpose of this study is to find out the differences in gender intelligence based on grades and scores between female and male students of Dentistry Department of Kabul Medical University of Medical Sciences.

Materials and Methods

The cross-sectional prospective study was conducted upon approval of the scientific research and ethic center of the Allied Health Kabul University of Medical Sciences committee, under protocol no. REC: 23/1399. All aspects of this study follow the ethical standards of the relevant national and institutional committees on studies also subsequent revisions.

The sample size estimation was created on the consecutive sampling where a common practice is to select all cases which are accessible in a given period of time or to select a sample size based on a previous study[10].We obtained a list from the Dentistry Department of Kabul University of Medical Sciences.

All the Dentistry Department students who attended the classes and participated in the final exam of fall semester of 2019 academic calendar year were included in the study. Students who could not join the classes and did not participate in the final exam, were excluded from the study.

The study team collected the required data first by going through result sheets of exams and then using the electronic data records from Dentistry Department. Then the percentage of attendance has been calculated separately to find which group (Male or Female) is more among top ten students in each class. And also, we have calculated how many students (Male or Female) have percentage higher than 80 percent in each class. And 610 students (332 females, 278 male) were participated in this study. Two Sample t- test and MS Excel were used for statistical analysis of our Prospective Observational Study.

Results and Discussion

From a total of 610 Dentistry Department of Kabul University of Medical Sciences students which is one the top public universities in Afghanistan, 278 were males and 332 females. Similar to our study, Mankumari Parajuli assisted the academic performance based on gender differences which engaged 240 public and private school students in 2016[1].

The total number of students in the first class was 174 (87 male and 87 female). Out of them 47 female and 30 male students got scores higher than 80% (Figure 1). Moreover, four males and six female students of the same class were among the top 10 students. The average score of female students was 77 out of 100, while the average score of male students was 67 out of 100 (Table 1). Independent sample T-test showed that the difference between the scores of female and male in first class was significant ($p < 0.0001$).

The total number of students in the second class was 154 (71 male and 83 female). Out of them 33 female and 14 male students got more than 80% (Figure 2). Moreover, two male and eight female students of the same class were among the top 10 students. The average score of female students was 75 out of 100, while the average score of male students was 66 out of 100 (Table 2). Independent sample T-test showed that the difference between the mean scores of female and male in the second class was significant ($p < 0.0001$).

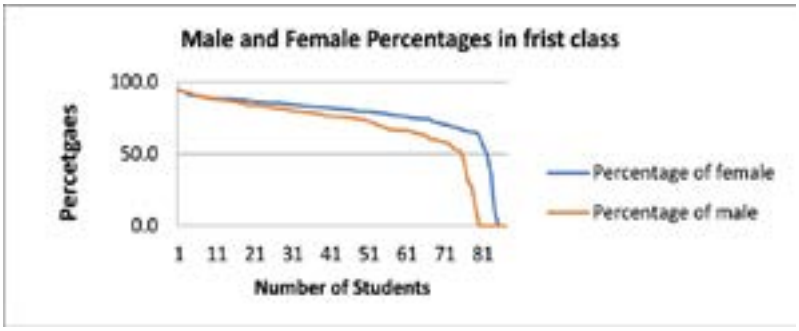

Figure 1 – Difference between male and female percentages in the first class

Table 1 – Statistical analysis of scores in the first class.

Descriptive statistics	Female score	Male score
Mean	77	67
Median	81.2	78
Mode	88.7	0
Standard deviation	16.9	25.7
standard error	1.8	2.7

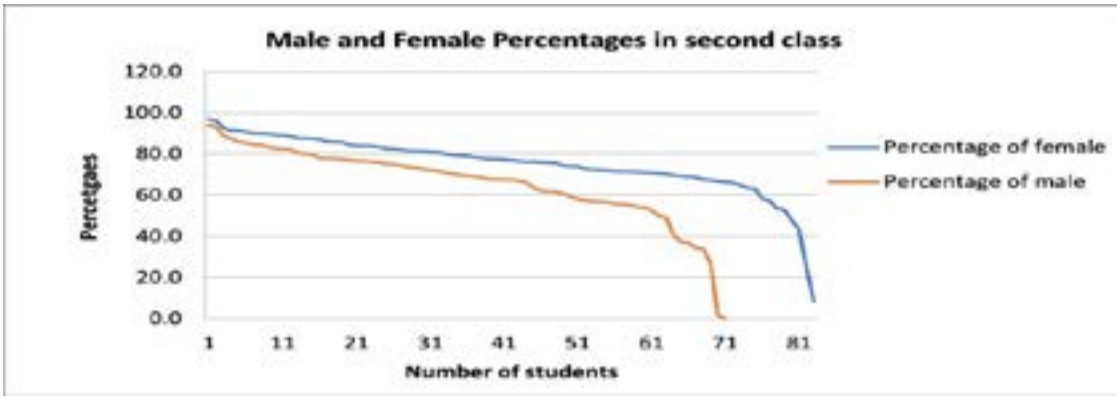

Figure 2 – Difference between male and female percentages in the second class

Table 2 – Statistical analysis of scores in the second class

Descriptive statistics	Female score	Male score
Mean	75	66
Median	77	69
Normal	91	77
Standard deviation	14	18
Standard error	1.5	2.1

The total number of students in the third class was 160 (69 male and 91 female). Out of them 57 female and 23 male students got scores higher than 80% (Figure 3). Moreover, two male and eight female students of the same class were among the top 10 students. The average score of female students was 79.2 out of 100, while the average score of male students was 74.4 out of 100 (Table 3). Independent sample T-test showed that the difference between the mean scores of female and male in the third class was significant ($p < 0.0001$).

The total number of students in the fourth class was 122 (51 male and 71 female). Out of them 42 female and 17 male students got scores higher than 80% (Figure 4). Moreover, three male and seven female students of the same class were among the top 10 students. The average score of female students was 80.5 out of 100, while the average score of male students was 72.8 out of 100 (Table 4). Independent sample T-test showed that the difference between the mean scores of female and male in the fourth class was significant ($p < 0.0001$).

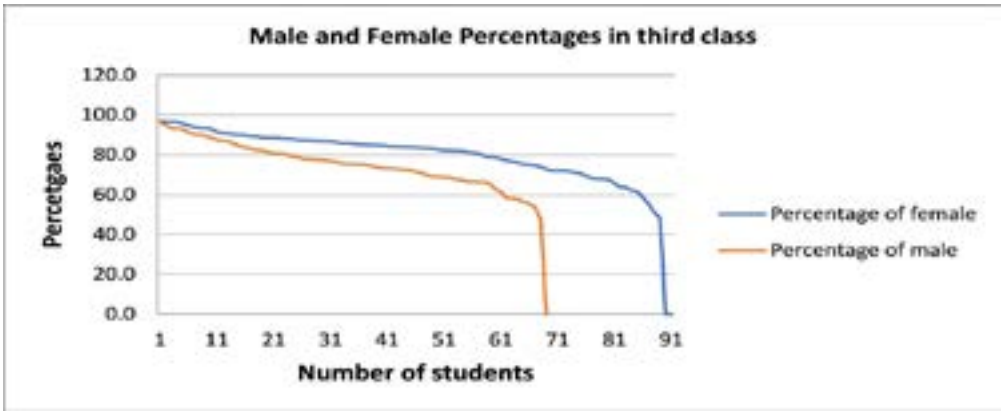

Figure 3 – Difference between male and female percentages in the third class

Table 3 – Statistical analysis of scores in the third class

Descriptive statistics	Female score	Male score
Mean	79.2	74.4
Median	83.8	75.3
Mode	91	75
Standard deviation	15.8	14.1
standard error	0.04	0.04

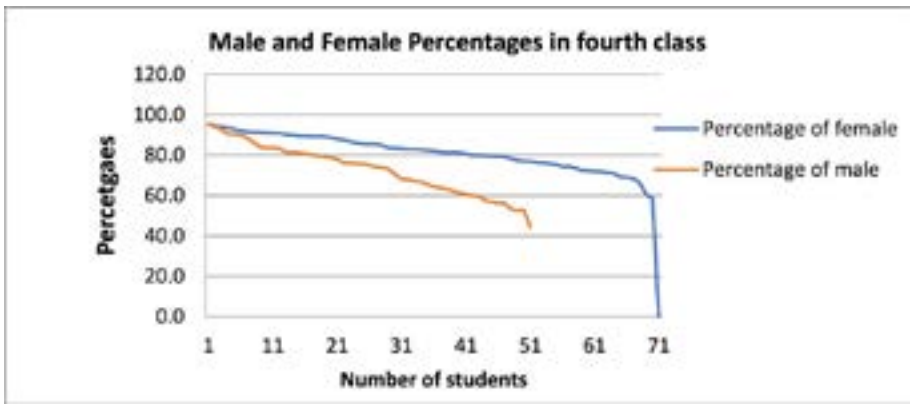

Figure 4 – Difference between male and female percentages in the fourth class

Table 4 – Statistical analysis of scores in the fourth class

Descriptive statistics	Female sco	Male score
Mean	80.5	72.8
Median	82.2	75
Mode	90.9	90.4
Standard deviation	12.7	12.5
standard error	1.5	1.7

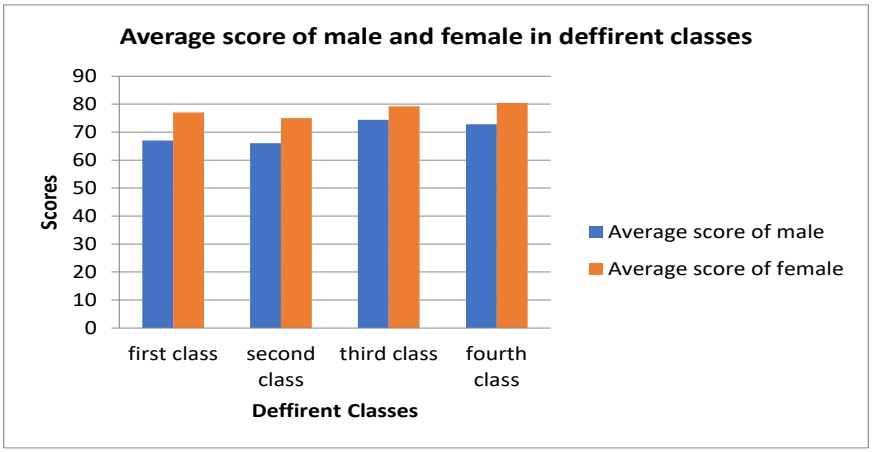

Figure 5 – Difference between average score of male and female in different classes

This study showed that the average score of female students is higher than male students, and also the number of female students is higher in top 10 students than male students in each class (Figure 5). This research showed that the number of female students is higher in top ten than male students in each class of Dentistry Department. The number of female students, with percentage higher than 80%, exceeded the number of males in different classes of Dentistry Department which is similar to the study of Parajuli et. al., which concludes that female students seem to do better than their male counterparts in terms of academic performance such as results, homework, attendance and determination [1].Steven a. haist et. al., indicates that female students performed better than men on the clinically based performance examinations in medicine. There has been a research on the analysis of success in medical school regarding the effect of gender. Koenig et. al., reveal that men performed better than women in certain settings, while women performed better than men in other settings. Men have performed better than women on several standardized written examinations.[11]

Many studies have shown that women score higher in self-assessed empathic behavior and emotional intelligence. One reason for this could be that women often express more emotions and have shown higher skills for effective interpersonal relationships and communication[12]. However, some studies have suggested that this self-assessment could be falsified by socially prescribed role models. Brain, Chamorro-Premuzic and A.Arteche et.al., stated that hormone types are different between male and female such Testosterone, androgen and progesterone so the same intelligence of male and female is different[12]. It is difficult to say that both are equal, or one has higher or lower indicatorsthan the other. that the findings across countries show that males have performed better on Mathematics tests than females, but the male-female difference in math scores is related to gender inequality in social roles. Studies have shown that girls spend more time reading than boys and read more for fun. They also proposed that discrimination, lack of opportunity, women's responsibilities in motherhood, or emotional factors may have accounted for the fact that few women had careers in intellectual fields[12].

In contrast, Karel Kleisner, Chratatora and J.Fleger et.al., stated that Perceived Intelligence is associated with measuring intelligence in men but not women. They were able to estimate intelligence with an accuracy. Higher then chance from static facial photographs of men but not from photos of women. At the same time, they found no differences in the

abilities of men and women to assess intelligence from static facial photos [13] Fisher et al. could show that men rated lower in self-reported emotional intelligence but showed the same perception for emotions as women[13]. These statements are supported by studies which have shown that when empathy was assessed by patients and simulated patients, gender had no influence. Other authors suspect a difference between men and women not necessarily to be connected with global emotional intelligence but more with single facets of emotional intelligence [14]

However, in research of Uner Tan et al., on the relationship between serums total testosterone level and the fluid intelligence was studied in men and women. There were no significant differences between IQs (intelligence quotient) of men and women. There was an inverse curvilinear relationship between IQ and serums total testosterone level in women. The same was found also in men, but the declining part of the regression line at high T levels was not as pronounced as in women. It is concluded that serums total testosterone level may be related to IQ, even in subjects exhibiting no sex difference in IQ tests; too low or too high T levels may be disadvantageous for the fluid intelligence, especially in women[15].

Psychologist Lewis Terman in his 1916 study of children's IQs, concluded that "the intelligence of girls, at least up to 14 years, does not differ materially from the boys". He did, however, find "rather marked" differences on a minority of tests. For example, he found boys were "decidedly better" in arithmetical reasoning, while girls were "superior" at answering comprehension questions[16].

M. Khaleel stated that females have better educational skills than males, but males have better intelligence[17]. An alternative study found that learning different concepts differed between the sexes and related to brain structure and socio-cultural factors. Family is effective in education. It has also been found in this study that the male students have more achievements in mathematics and the females have more achievements in science[18] which is analogous to our study.

Conclusion

Our finding showed that percentage of female students were better compared to male students in all grades. Also, female students appear more often in top ten than male students in each grade, and the number of female students who have gotten more than 80 percent were higher than male students in the first, second, third and fourth classes of dentistry department. So, we can conclude that female students are better in medical subjects and they are diligent in their lessons compared to male students.

Limitations

The findings of this study are representative of students of the Dentistry Department of Kabul University of Medical Sciences. A larger sample size with widespread variable would provide a broader idea of the topic.

Suggestion

The authors would like to suggest the following:

1. Further multicentre study with a larger sample size should be conducted in this particular topic to assess the possible personal property of mental power of both genders.
2. For the reason that female gender was better compared to male gender, the necessary attention should be paid to providing opportunity of standard educational system not only in religious studies but also in science and technology.

Acknowledgement

We would like to appreciate dentistry department for providing the figures. We hope the findings of this research paper will be useful for the readers.

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THE COVID-19 PANDEMIC, UNIVERSAL HEALTH COVERAGE AND PRIMARY HEALTH CARE STRENGTHENING

In light of the COVID-19 pandemic, this article provides a review of the literature on the development of the World Health Organization (WHO) universal service coverage concept, starting with the 1978 Declaration of Alma-Ata on Primary Health Care, including the 2018 Declaration of Astana as an integral basis for all comprehensive healthcare systems.

WHO Political Declaration 2019. The development of primary health care in the CIS countries followed different scenarios, often deviating from the principles of the Alma-Ata Declaration. In the Analytical review of the organization on the provision of medical services in the Kyrgyz Republic during the reform of health care, the basic principles of PHC and family medicine were also implemented with distortions, which played a negative role in the context of the pandemic. The COVID-19 pandemic has rejected all countries on the path to universal health care, but also demonstrated the critical role of the absence or insufficiency of sustainable and high-quality primary health care, tested the strength of health systems around the world, highlighting the urgent need to achieve universal health care coverage, which is only possible with strong primary health care.

Key words: universal health coverage – UHC, Alma-Ata Declaration on PHC, Astana Declaration, UN Political Declaration on UHC, COVID-19 pandemic.

Introduction

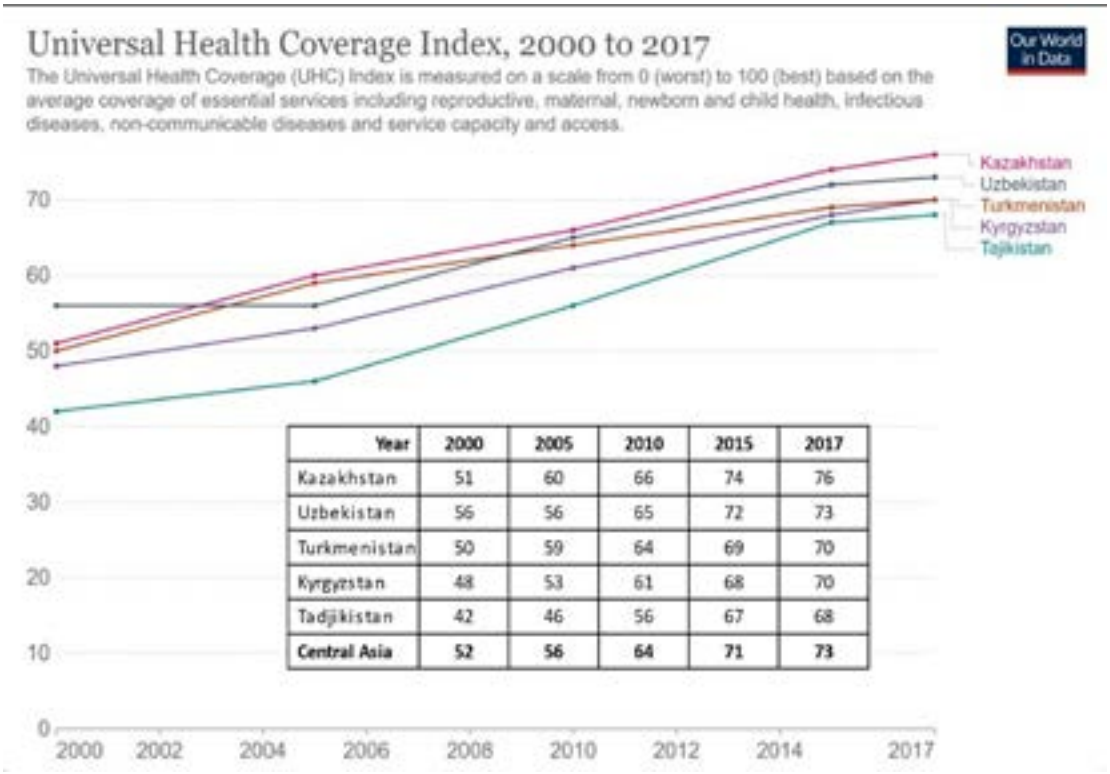
Over the past two years, the COVID-19 pandemic has been the most devastating event for healthcare systems worldwide. Primary health care plays a critical role during the pandemic, facilitating early recognition, resuscitation and referral of people with COVID-19, and providing coordination and continuity to maintain other essential health services and limit hospital stays. A strong primary health care framework, including accessible first aid services, links between levels of the health system, supports the dynamic adaptations needed to limit transmission of COVID-19 and safely deliver services during pandemic outbreak and decline. The pandemic has tested the strength of the health care system and the deployment of response forces al over the world. Many countries have already suffered the second and third waves of the disease. This forced us to look for completely new approaches to the diagnostics and treatment of this new infection, to apply exceptional measures to protect the population, patients and medical workers. At the same time, it showed that the health systems of many countries cannot provide effective medical care to all segments of the population, and not only are many people facing a deadly virus without frontline support, the rest of the population is also suffering collateral damage due to a sharp decline in access to health services [1].

In this regard, many world health experts are again raising questions about the need to step up to implement the UN Political Declaration on Universal Health Coverage (UHC) 2019 [2-4].

The Declaration influenced a generation of public health workers towards achieving health for all through the primary health care strategy. The Declaration also emphasizes the importance of primary health care services. Primary health care serves as a person's first point of contact when people seek health care, interacting with their family and community, solving most problems, and acting as the fulcrum of the health system, referring patients to other services when needed. None of these principles have lost their relevance over time.

The issue of universal health coverage was first raised many years ago, when the famous Alma-Ata Declaration [5] was adopted in Almaty at the historic 1978 PHC conference and the concept of "Health for All" by the year 2000 was proclaimed. However, this concept was never fully implemented [6].

WHO data shows that in 2000 the UHC index for Central Asian countries [7] ranged between 42 and 56, with an average being 52. Subsequently, due to active measures in developing health care system, the UHC index increased significantly by 21 points (Figure 1). Kazakhstan showed the highest coverage with health services, while other Central Asian countries also improved their indicators. However, nevertheless, in 2017, the UHC index for Central Asian countries was only 73 points, indicating that almost a third of the population of our countries did not have access to modern health services.



Year	2000	2005	2010	2015	2017
Kazakhstan	51	60	66	74	76
Uzbekistan	56	56	65	72	73
Turkmenistan	50	59	64	69	70
Kyrgyzstan	48	53	61	68	70
Tadjikistan	42	46	56	67	68
Central Asia	**52**	**56**	**64**	**71**	**73**

Figure 1 – Dynamics of the UHC index in Central Asian countries of from 2000 to 2017. (accessed 12.12.2021 [7])

It is clear that the COVID-19 pandemic has thrown all countries back on the way to achieving UHC, but it also showed the extraordinary role of the absence or insufficiency of sustainable and high-quality primary health care [8], harshly reminding of the need to implement those fundamental principles that were laid down in Alma-Ata (1978) and were confirmed in the Astana (2019) declarations. In this regard, it is important to recall why the concept of "Health for all by 2000" has not been implemented.

Alma-Ata Declaration 1978. The International Conference of WHO and UNICEF on PHC was held in Alma-Ata in the period September 6 – 13, 1978. The participants adopted the historical Alma-Ata Declaration [5]. In it, for the first time in the history of mankind, all states recognized health as a fundamental human right, the achievement of which requires efforts of not only the health sector, but also joint efforts of other sectors of society, including the civilian and the population itself. The Declaration emphasized the responsibility of Governments to the health of their peoples, while making health services equitable, accessible and effective as a critical condition. The Alma-Ata Declaration highlighted the central role of primary health care (PHC) as an essential foundation for an entire comprehensive health system. As the first level of contact for individuals, families and communities with the national health system, PHC brings health care closer to where people live and work and represents the first step in a continuous process of protecting public health, while playing an important role in integrating with all other levels and sectors of the health care systems.

It should be emphasized that in the 70s of the last century, a lot of facts have been accumulated about the importance of PHC. One of the fundamental works of 1961, entitled "The Ecology of Medical Care" [9], shows that out of 1000 people in the population, only 15 (or 1.5%) are hospitalized

within a month, including only 1 (or 0.1%) patient admitted to a tertiary hospital. The overwhelming majority of people (98.5%) visit or should be under the supervision of a primary health care provider. These data were confirmed in similar studies in many countries, which allowed us to talk about some patterns. Thus, Roncoletta et al. (2012) summarizing data on hospitalization in university clinics, proposed the "One in a Thousand" rule [10]. In the works of recent years, it has been shown that in modern conditions the need for inpatient medical care is even more reduced [11].

The historical Alma-Ata conference on PHC has had a significant impact on the development of the entire world health care system [12,13]. Changes in the health status of the population in different regions of the world in the period after Alma-Ata conference indicate that life expectancy has increased, medicine has become closer to humans, and many states have begun to pay more attention to health issues and even included the principles of the Alma-Ata Conference in their constitutions. However, although many developed countries have made progress since 1978, at the same time, the efforts of a number of countries have gradually faded due to the dominant political and economic climate, and the development of primary care did not go the way it was determined by the declaration. In the context of the global crisis, even developed countries started to reduce social programs, including the domain of health care. Selective approaches using limited health packages have been used instead of programs for fundamental reorganization of health care. The very philosophy of PHC, contained in the Alma-Ata Declaration, was distorted. Some perceived it as a call to reduce the role of hospitals, while others understood the essence of PHC as a primitive aid for poor people, as a solution for developing countries [14].

From Almaty to Astana. Further advancement of the PHC philosophy is associated with the opening of the WHO European Center for Primary Health Care. The center was established by the decision of the WHO Executive Committee and with the support of the Government of Kazakhstan in 2015 in Almaty and today is a center of excellence in the field of primary health care and healthcare organization. In 2016, an Advisory Group on PHC was established, which began active discussions on the role of PHC in modern conditions and the prospects for its development until 2030 [15].

On October 25, 2018, in Nur-Sultan (until March 2019 – Astana), all WHO member states unanimously approved of the Astana Declaration on Primary Health Care (PHC) [16], which reflects the development in the 21st century of both primary care and the entire global health system aimed at ensuring universal access to health care.

The Astana Declaration reaffirms the core values and principles of the 1978 Alma-Ata Declaration, while at the same time reinforcing the emphasis on primary health care as a key factor in people-centered health systems [17,18]. The Declaration highlights the need to move from health systems designed around diseases and health facilities to health systems designed around and for people. The Astana Declaration clearly spells out the responsibilities and obligations of states represented by heads of state, ministers of health and leaders of other sectors. The Declaration calls on all countries to adequately fund primary health care, to ensure the financial sustainability, efficiency and resilience of national health systems through adequate allocation of resources for primary health care. As noted in the Astana Declaration, knowledge, including scientific knowledge, will contribute to the success of PHC; conducting scientific research, strengthening the capacity of primary health care; ensuring decent working conditions and adequate remuneration for PHC workers, increasing investment in education and training; introduction and application of new technologies.

The Astana Declaration was widely discussed and supported by the participants of the conference dedicated to the 40th anniversary of the Alma-Ata Declaration (Astana, October 25-26, 2018), and in May 2019, the governments of 196 countries ratified it at the WHO World Health Assembly [19-20]. Numerous publications devoted to the Astana Declaration have been placed in the world's leading journals. It should be noted that the World Organization of Family Physicians WONCA fully supported the main provisions of the Astana Declaration, while expressing concern that the role of family medicine was not clearly noted in it [21-22].

Alma-Ata Declaration and problems of healthcare organizations in the CIS countries and Kyrgyzstan. Since 1930-1940s, the Soviet Union encouraged the process of specialization of medical care, which in the 60s of the last century spread to the outpatient level. Many specialty physicians were introduced to the staff of polyclinics, and any patient by "self-registration" could apply for a quick check of highly qualified and specialized medical care. Such health care system was demonstrated to the delegates of the Alma-Ata conference and presented as the highest achievement of the Soviet "model" of PHC. Unfortunately, the Soviet leadership viewed the conference more as a significant ideological or political event, but in fact later showed a lack of understanding and rejection of the basic principles of

primary health care and family medicine [23].

The Soviet system of "specialized" PHC in subsequent years began to manifest itself in significant negative shifts. As a result of the chaotic movement of patients from one specialty doctor to another, the number of unnecessary examinations sharply increased, the workload of specialty doctors increased as well, and unreasonable referrals for inpatient treatment and examination became more frequent. The fragmentation and inconsistency of the recommendations of different consultants often did not optimize, but worsened the results of treatment and the patient's condition. The continuity of observation of a patient, and even more so of his family, was disrupted. The preventive activity of district doctors has decreased. In the end, all this led to an increase in the cost of medical care, a deterioration of the qualifications of both district and specialty doctors, and a quality deterioration of medical care in general [24-25].

And if the Soviet Union could still barely maintain such a cumbersome and costly system of medical care, the collapse of the country revealed its unviability in the context of the transition to the market economy in most of the CIS countries. In the 90s of the XX century, reform in the health care began in the post-Soviet countries, the key moment of which was the development of primary health care and the implementation of the principles of family medicine, which fully corresponded to the basic principles of the Almaty Declaration. Despite the difficulties of the transition to a market economy, by 2000, most of the post-Soviet countries have implemented institution of family medicine, provided retraining for doctors, and launched training of family medicine residents [24].

However, it should be recognized that from the very beginning, the principles of family medicine were not fully implemented in all CIS countries. Insufficient attention to primary health care, unsatisfactory working conditions, inadequate understanding of the role of the family doctor, insufficient funding that does not provide a decent level of salary and other factors have led to a significant decrease of the image of the family doctor and the outflow of staff.

In Russia, the reform of PHC in the format of general medical practice has not been completed entirely yet. At the primary level, along with general practitioners, there are wide variety of specialty doctors, who disrupt the uniformity of the entire PHC system, making it impossible to demonstrate both medical and economic efficiency [26].

An analytical review of organization of health services delivery in the Kyrgyz Republic, prepared with the support of the WHO European Center for Primary Health Care in 2017 revealed the lack of a clear model for the provision of primary health care; and low prestige of family medicine led to the outflow of personnel, poor quality of medical services and the reluctance of population to apply to the PHC [27]. The lack of strong primary health care and underdevelopment of family medicine, insufficient funding and limited resources have been particularly critical during the Covid-19 pandemic.

Conclusion

UN Political Declaration on Universal Health Coverage as development of ideas of the Alma-Ata and Astana conferences. The Political Declaration of the UN High Level Meeting on Universal Health Coverage (UHC), endorsed by all countries on September 23, 2019, made the most comprehensive set of commitments for the development of global world health [28]. This document once again recognizes "...that primary health care brings people into first contact with the health system and is the most inclusive, effective and efficient approach to enhance people's physical and mental health, as well as social well-being, and that primary health care is the cornerstone of a sustainable health system for universal health coverage and health-related Sustainable Development Goals, as was declared in the Declaration of Alma-Ata and reaffirmed in the Declaration of Astana" [28].

But while universal health coverage (UHC) is one of the main development goals adopted by the United Nations and the World Health Organization (WHO), the COVID-19 crisis has clearly shown that achieving UHC at a sufficiently optimal level and protection of the most vulnerable population groups remains an unresolved problem even for the richest countries. Therefore, many health professionals and WHO experts propose number of measures to increase the resilience of health systems to ensure universal health coverage and health security during the COVID-19 pandemic and beyond [29, 30].

Today, COVID-19 calls on us to urgently reaffirm what was said in Almaty and Astana: only universal coverage with equitable, affordable and comprehensive health services, based on strong primary health care can ensure our security now and in the future!

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CHANGES IN ROUTINE VACCINATION COVERAGE IN THE REPUBLIC OF KAZAKHSTAN DUE TO THE COVID-19 PANDEMIC

Lack of access to primary health care and a distraction from routine health care leading to increased morbidity and mortality. As COVID-19 has caused a breakdown in immunization systems, the future of the relentless fight to prevent vaccine-preventable deaths is at stake. The aim was to study the change in the level of routine vaccination coverage in the Republic of Kazakhstan in connection with the COVID-19 pandemic. An analytical study of the official data of the scientific and practical Center for Sanitary and Epidemiological Expertise and Monitoring for 2020 and 2021 was carried out. Compared to 2020, the level of routine vaccination coverage in Kazakhstan in 2021 has increased. Immunization coverage rates for children under 1 year of age in the Republic of Kazakhstan dropped significantly during the initial period of the COVID-19 pandemic and only partially began to recover during the remaining months of 2020. Compared to 2021, the difference was already significant.

Key words: COVID-19, routine immunization, coverage, Republic of Kazakhstan, incidence.

Introduction

The emergence of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has brought the world into a crisis of unprecedented scale and scope [1]. As governments around the world tried to regulate the outbreak by imposing quarantines on the entire population, closing borders and halting mass gatherings, experts have begun to worry about indirect health consequences. These disruptions are likely to jeopardize the course of various programs, including immunization campaigns, which have proven to date to be valuable and effective in terms of public health costs [2–5]. In an attempt to mitigate the devastating impact of the COVID-19 pandemic, the World Health Organization (WHO) has issued guidance calling for a temporary suspension of operations of mass immunization programs around the world [5,6].

According to data compiled by WHO, the United Nations Children's Fund (UNICEF), the Global Alliance for Vaccines and Immunization (GAVI) and the Sabin Vaccine Institute, the suspension of vaccination services in more than 68 countries has resulted in at least 80 million deaths (children under one year in the risk group) [7]. In low- and middle-income countries (LMICs), where health systems are under strain, even temporary disruptions can leave a devastating impact on health, opening the door to the possible re-emergence of other diseases [8–12]. An analysis by GAVI has shown that an additional 24 million people who have been protected by vaccination so far are now at risk as some 90 mass vaccination campaigns have been postponed [5,13-16]. With continued declines in vaccination coverage, cases of intensified outbreaks of measles, diphtheria, whooping cough and other vaccine-preventable diseases (PVDs) are making headlines [17], and multiple cases of poliomyelitis and diphtheria have been reported in Pakistan and Afghanistan [18]. Measles is on the rise around the world [19,20], dengue is flaring up in regions of Latin America [21] and the Amazon [22], and countries in Africa are under enormous pressure as they contend with measles and Ebola outbreaks [15]. These outbreaks are a stark reminder that even during a pandemic, public health concerns are just as important, if not more so. Based on historical and epidemiological analyzes, as well as data from recent modeling experiments, the importance of maintaining essential health services, including immunization, is emphasized [18]. WHO predicted an increase in malaria mortality in endemic regions [21]. Similarly, historical evidence of past global disease outbreaks (e.g., diphtheria in the former Soviet Union in 1990-1996), wars, and infectious threats have shown that lack of access to primary health care and a distraction from conventional health services lead to increased

morbidity and mortality [22]. As COVID-19 has caused a similar disruption in immunization systems, the future of the hard fight to prevent vaccine-preventable deaths is at stake.

Aim. To study the change in the level of routine vaccination coverage in the Republic of Kazakhstan in connection with the COVID-19 pandemic.

Materials and Methods

An analytical study of the official data of the scientific and practical Center for Sanitary and Epidemiological Expertise and Monitoring for 2020 and 2021 was carried out.

Results and Discussion

During the first 5 months of 2020, BCG vaccination coverage (the baby is vaccinated 3-4 days after birth in the hospital) remained between 90-95%, while coverage with combination vaccines was reduced. In January 2020, coverage with the combined vaccine TDap, Hib, IPV-3 was 7.4%, in February 15.4%, in March 5.7%, and during the lockdown in the Republic of Kazakhstan, which was in April, the indicator was 0 ,4%. In May it increased to 6.8%. Scheduled immunization with the combined vaccine DTap, Hib, IPV and HBV-4, MMR-1 and against pneumococcal infection have similar indicators with the prophylactic combined vaccine TDap, Hib, IPV-3. As shown in Figure 1, the coverage curves between vaccines (except for BCG) are identical.

Compared to 2020, the level of routine vaccination coverage in Kazakhstan in 2021 has increased. In the second month of life, the child is given two important vaccinations: the combined DTP + Hib + HBV + IPV (Figure 2) and a single vaccine against pneumococcal infection (Figure 3). The vaccination coverage rate of the combined DTP + Hib + HBV + IPV in 2020 was 94.5%, and in 2021 – 98.5%. Immunization coverage against pneumococcal disease increased from 93.6% (2020) to 97.6% (2021).

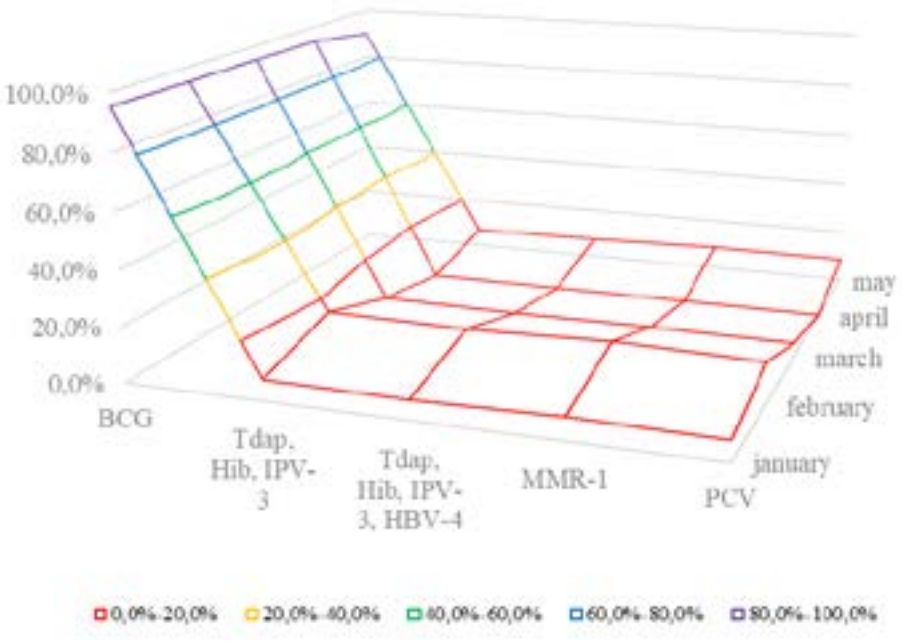

Figure 1 – Change in routine vaccination coverage in the Republic of Kazakhstan due to the COVID-19 pandemic in the first 5 months of 2020
Abbreviations: 1. BCG – vaccine against tuberculosis; 2. TDap, Hib, IPV-3 – combined pertussis vaccine with acellular pertussis component, diphtheria, tetanus + Haemophilus influenzae type b + inactivated polio vaccine;3. TDap, Hib, IPV, HBV-4 – combined pertussis vaccine with acellular pertussis component, diphtheria, tetanus + Haemophilus influenzae type b + viral hepatitis B + inactivated polio vaccine; 4. MMR-1 – vaccine against measles, rubella and mumps. 5. NVD – against pneumococcal infection;

A month later, they give one combined DTP + Hib + IPV vaccine – this time without hepatitis B vaccination and without pneumococcal injection. Coverage was 90.1% in 2020 and 92.3% in 2021. At 4 months, two repeated injections of DTP + Hib + HBV + IPV are given, which were made at the 2nd month of life. According to the scientific and practical Center for Sanitary and Epidemiological Expertise

and Monitoring, the difference in coverage was 7.1% (2020 – 88.3%, 2021 – 95.4%). It is worth noting the only case of a negative difference with 2021. The volume of vaccinations in 2020 was 97.2%, but in 2021 it decreased and amounted to 92.9%.

At the age of 12-15 months, 3 vaccinations are given: a combined one against measles, rubella and mumps (MMR), as well as a vaccine against pneumococcal infection. In addition, they give an oral drug for polio in the form of drops on the tongue. The MMR vaccination coverage rate in 2020 showed 92.9%, and in 2021 – 97.4%. 88.7% were vaccinated with pneumococcal vaccine in 2020, and 92.6% in the following year, 2021.

Figure 2 – Routine vaccination coverage in the Republic of Kazakhstan during the COVID-19 pandemic in 2020 and 2021

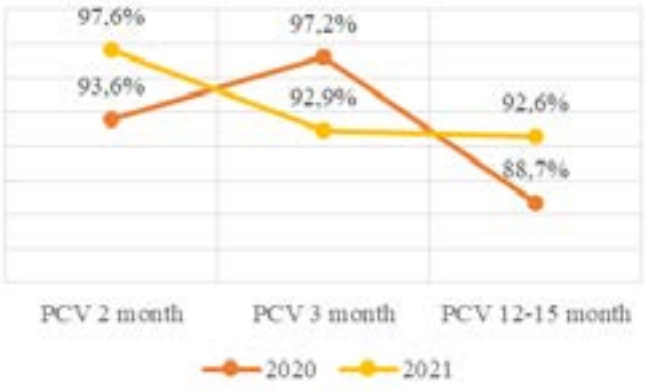

Figure 3 – Routine vaccination coverage in the Republic of Kazakhstan during the COVID-19 pandemic in 2020 and 2021 against pneumococcal infection

Conclusion

The main way to address the control of vaccine-preventable infections in the context of the COVID-19 pandemic is to carry out vaccination in children. Combination vaccines in the vaccination calendar will reduce the number of visits and increase the coverage of immunization of target groups against several diseases. In the context of the implementation of measures aimed at preventing the spread of COVID-19 infection, it is of particular importance to vaccinate vulnerable groups of the population with vaccines against pneumococcal infection and seasonal influenza.

Immunization coverage rates for children under 1 year of age in the Republic of Kazakhstan dropped significantly during the initial period of the COVID-19 pandemic and only partially began to recover during the remaining months of 2020. Compared to 2021, the difference was already significant.

Public health measures and educational activities for health professionals and parents are needed to ensure adequate population coverage. Detection of delayed or missed vaccinations to prevent potential outbreaks of vaccine-preventable diseases is an important part of the public health system.

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PUBLICATION ACTIVITY OF CENTRAL ASIAN SCIENTISTS ON ARTIFICIAL INTELLIGENCE INCLUDING MEDICINE

This paper presents the results of the publication activity research of scientists from Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) in the field of Artificial Intelligence (AI), including health science and medicine in the referenced databases Web of Science, Scopus, EBSCO Publishing and Springer Link. The issue of strategic and regulatory documents on the development of AI in the countries of Central Asia (CA) and measures for developing this area in the region was considered as well. From the scientometric review, it became known that in the aggregate, the Central Asian countries make an insignificant contribution to the development of AI, including the development of AI in medicine, if we consider the number of publications and their citations in databases at the time of the study in May-July 2021. It was recommended to multiply support for scientific research and publication activity of scientists in Central Asia to increase the regional contribution to the development of AI in medicine and healthcare.

Key words: Publications, Artificial Intelligence, Medicine, Central Asia.

Introduction

The Central Asian region is a growing market for more than 74 million people. It is located between two major world economies – China and Russia, thus creating additional potential for its development. However, so far, not all the opportunities for growth have been used.

As a growing market, Central Asia meets the key factors to become a distinctive research and innovation center on the map of the world's leading innovation centers. Innovations play a particularly important role for the region, as they can bring potential benefits to it. Innovations can contribute to solving existing problems, such as large groups of the population without sufficient access to digital services, banking services, health care and education. Currently, the potential for regional cooperation is still low, which affects regional initiatives in the field of economics, science, education and healthcare. Nevertheless, there are already some regional initiatives, especially in the field of economics, energy, and recently in the field of science and education, including cooperation in the field of AI technology. Therefore, we consider it important to study the level of publication activity and normative activity of Central Asian scientists in the field of AI, as well as AI in medicine.

Currently, for an independent and objective assessment of the activities of scientists and researchers, it is customary to use scientometric indicators or indices of the effectiveness of scientific activity. According to experts in the field of scientometrics the following indicators are critical among many others assessing the effectiveness of scientific work: the total number of publications, the citation index of publications and the Hirsch index (h-index).

As in the whole world, the system of scientometric indicators is increasingly being used in the countries of Central Asia (CA) to increase the scientific potential of scientists and research organizations. A number of government decrees and documents regulating the regulatory framework in the field of science development have been adopted at the legislative level of all Central Asian countries. The Ministries of Education and Science of the Central Asian countries recommend scientometric indicators when determining the individual and institutional rating, which directly affects the level of funding for the scientific direction.

Interdisciplinary research is developing particularly intensively, including those in the field of digitalization and informatization. In this regard, many countries have also developed national development strategies and concepts for focused research of certain areas of science.

In our study we have combined 2 directions, which, in our opinion, are the points of growth and

development of the country and society: an artificial intelligence and AI in healthcare. The importance of AI technologies can hardly be overestimated, especially the rapid development of AI technologies has taken place over the past ten years. In this context, big data has accumulated that can be objectively studied and taken into account when developing national AI development strategies. Moreover, various international organizations also pay attention to aspects related to the development of AI. The WHO (2021) has listed basic principles for the ethical use of artificial intelligence in the field of healthcare. Twenty experts participated in the preparation of the guidance and has developed it over last two years. This guidance highlights the huge potential of the technology, especially in resource-poor regions. But the authors also warn against hasty and thoughtless use of AI in medicine. As was indicated in the guidance, – "There are many ways to use AI in healthcare, from analyzing images and medical histories to monitoring devices for the state of the body and systems for predicting outbreaks of infections. But if you implement this tool without due care, instead of the expected benefit, the patient may be harmed". Nevertheless, the importance of AI technologies in general is not disputed by anyone, but there are calls to be careful. In this connection, the study of the level of development of AI technologies in the world, including by region, in our opinion, has a certain scientific and practical significance.

By studying the publication activity of Central Asian scientists in this field of research, we have analyzed regulatory documents and scientometric indicators in the referenced databases Web of Science, Scopus, EBSCO Publishing and Springer Link.

A group of researchers from Stanford University (USA) annually presents a report on the level of AI development "AI Index", which analyzes the level and development trends of about 20 countries by more than 20 indicators, AI Index Report [1]. In the latest report for 2021, the following main conclusions were made in chapter IV on publication activity: – The number of journal publications in the field of AI increased by 34.5% compared to 2019 and 2020; – over the past 6 years alone, the number of review publications in the field of AI based on the materials of the arXiv has increased more than sixfold, from 5,478 in 2015 to 34,736 in 2020; – AI publications account for 3.8% of all peer-reviewed scientific publications worldwide in 2019, compared to 1.3% in 2011 [2].

When studying the publication activity of scientists, referenced databases are widely used, the Web of Science and Scopus databases are especially in demand. For example, such a Scopus tool as the Scimago Journal & Country Rank allows to identify country leaders of publication activity in various fields of science. For the country rating of publication activity in the field of AI, publications from 1996 to 2020 are used for analysis. For the period of our research, the top 3 countries in the field of AI are China, the United States and India. Nevertheless, the publication activity in the field of Health Informatics (ICT in healthcare and medicine), including AI in medicine and healthcare in the United States, is about 2 times ahead of China. In turn, Russia takes the first place in the Commonwealth Independent States (CIS) in terms of publications in the field of AI, and Kazakhstan takes the first place in the countries of Central Asia, Scopus. Scimago Journal & Country Rank [3].

Materials and Methods

Content analysis of regulatory and legal documents in the field of digitalization of the national economies of Central Asian countries. The study of the national strategies of Central Asian countries in the field of AI development. Conducting a multifactorial scientometric analysis of the activity of education in the CA countries in the field of AI in medicine and healthcare in the referenced databases Web of Science, Scopus, EBSCO Publishing and Springer Link.

Results

State legal regulation in the field of AI in the Central Asian countries at the level of national strategies has already determined the development priorities. A number of legislative initiatives of the Central Asian governments were devoted to the development of ICT infrastructure, innovation and digitalization of economic sectors. In a number of these regulatory documents, AI, Big Data and intelligent systems technologies were also mentioned. However, in our analysis, we focused only on those regulatory documents that are directly related to the AI development strategy (Table 1).

Thus, at the time of writing the paper in May-June 2021, there was no separate state regulatory document defining the AI development strategy adopted in the Republic of Kazakhstan. However, in 2017, the Government of the Republic of Kazakhstan adopted Resolution No. 827 of December 12, 2017 "On approval of the State Program "Digital Kazakhstan". A number of provisions of this Resolution indicated priorities for developing AI until 2030, Resolution of the Government of Kazakhstan [4].

Table 1 – National AI development strategies of Central Asian countries (as of July 04, 2021)

Country	Main legal document	National AI strategy	Date of adoption
Kazakhstan	Yes	No	12.12.2017
Kyrgyzstan	Yes	No	14.12.2018
Tajikistan	Yes	No	30.12.2019
Turkmenistan	Yes	No	30.11.2018
Uzbekistan	Yes	Yes	05.10.2020 17.02.2021

On December 14, 2018, the Concept of Digital Transformation "Digital Kyrgyzstan 2019-2023" was approved by the Decision of the Security Council of the Kyrgyz Republic No. 2. The main goal of the Concept is the formation of an open digital society, the transition to digital governance, providing digital conditions for citizens when interacting with state bodies and local self-government bodies, ensuring transparency, reducing bureaucracy and corruption in state bodies, Decision of the Government of Kyrgyzstan [5].

The concept of the digital economy in the Republic of Tajikistan dated December 30, 2019, No. 642 was approved by the Decree of the Government of the Republic of Tajikistan. The main goals of the Concept are the creation of a stable and secure ICT infrastructure for high-speed transmission, processing and storage of large amounts of data, accessible to all organizations and households, as well as the use of mainly national software by state bodies, local governments and organizations, Decree of the Government of Tajikistan [6].

The concept of development of the digital economy of Turkmenistan was approved by the Decree of the President of the Republic of Turkmenistan dated 01.12.18 "On the concept of development of the digital economy of Turkmenistan for 2019-2025". The document reflects the state of the ICT system, the goals and objectives of the concept, the ways and mechanisms of its implementation, and the expected outcomes. It is expected that the transition to the digital economy will contribute to the development of investment activity, the introduction of advanced methods of public administration and the creation of new jobs in Turkmenistan, Decree of the President of Turkmenistan [7].

The Republic of Uzbekistan also actively carries out research in the field of AI, including the development and adoption of legislative acts, development strategies and support for scientific projects and academic educational initiatives. Thus, by the Decree of the President of the Republic of Uzbekistan No. UP-6079 dated 05.10.2020 "On approval of the strategy Digital Uzbekistan-2030 and measures for its effective implementation", the Digital Uzbekistan – 2030 strategy was adopted, where, among other items, it is expected that targeted programs of research and innovation projects to be adopted in the areas of development of the country's digital economy, Decree of the President of Uzbekistan [8].

On February 17, 2021, Uzbekistan adopted a Presidential decree "On measures to create conditions for the accelerated introduction of artificial intelligence technologies", which indicates the development of a national AI development strategy. The Resolution approved a list of pilot projects for the introduction of AI technologies in various fields that will be implemented in 2021-2022, including the development of AI technologies to diagnose pneumonia based on the analysis of computed tomography of human lungs, as well as breast cancer in the early stages based on the analysis of mammography. Moreover, the development of the necessary regulatory documents on the use of AI in medicine will begin, which will expand the capabilities of AI technologies in healthcare. The resolution also notes the creation of the first national repository for storing big data, including medical data, which give some hope for the rapid development and introduction of AI technologies in the healthcare of the Republic of Uzbekistan, Decree of the President of Uzbekistan [9].

When searching for publications on AI in the EBSCO Publishing database in Uzbekistan with the query "Artificial intelligence in Uzbekistan; Machine Learning in Uzbekistan; Big data in Uzbekistan", three publications were identified issued by Azimova, Matkovskaya et al. and Vikhrov, of which one is devoted to AI in medicine and one to Big Data in healthcare [10,11,12]. In Kazakhstan, two publications outside the field of medicine and healthcare were identified with the same search query, Abdrakhmanova et al. and Merembayev et al., [13, 14].

A search in the Springer Link database at the time of the study yielded one result only for Kazakhstan in the field of machine learning, Khoroshilov et al.

[15]. There were no publications in the study area indicated for the rest of the Central Asian.

A search in the Web of Science database on the Publon platform showed the following results: out of 10,532 scientists in Kazakhstan, only 22 have areas of scientific interest in their profile "Artificial intelligence; Machine Learning; Big Data", two scientists in the field of "Artificial intelligence in medicine" and there are the authors of 123 articles indexed in the WoS, Web of Science Group. Publons [16]. In turn, out of 2,586 registered Uzbek scientists, only 7 have "Artificial intelligence; Machine Learning; Big Data" in their profile with one scientist working on the theme "Artificial intelligence in medicine" and there are authors of 7 articles in the field of AI, Web of Science Group. Publons [17]. From Kyrgyzstan, only 1 scientist noted "Artificial intelligence; Machine Learning; Big Data" as his area of interest, with 1 article in the field of AI. There are 112 scientists registered of Tajikistan and 3 scientists of Turkmenistan, respectively, in Publon WoS, who mentioned "Artificial intelligence; Machine Learning; Big Data" as their area of interest.

The data from the Scopus compare the number of publications in the field of AI among 5 Central Asian countries for the entire period of Scopus database. The comparison was carried out against 6 indicators, such as the total number of publications in the field of AI, the number of cited publications, the total number of citations, including the number of self-citations, the relative index of citations per publication and the country Hirsch index in the field of study.

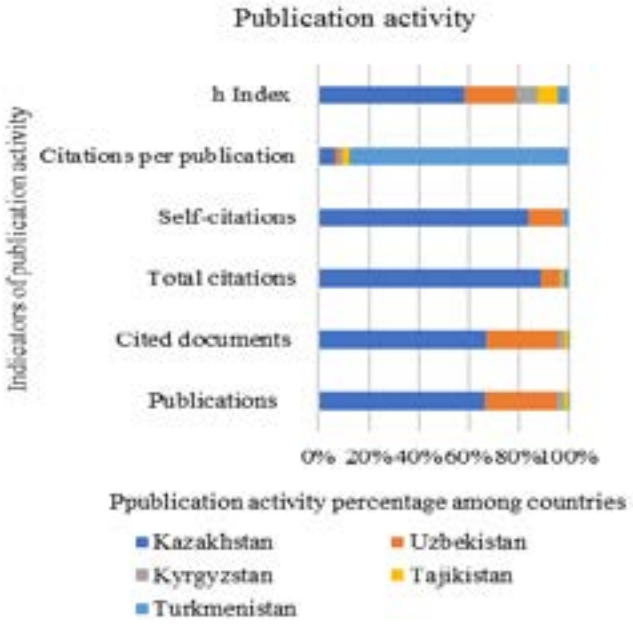

Figure 1 – Percentage of distribution of publication activity of Central Asian scientists in the field of AI in Scopus 1996-2020

As shown in Figure 1 the leaders of publication activity in the field of AI, including medicine are scientists of Kazakhstan, who wield about 2/3 of all published documents in the field of AI research. Then there are scientists of Uzbekistan with 1/3 of publications and the remaining Central Asian countries account for less than 10% of all publications, Scopus. Scimago Journal & Country Rank [18].

Discussion

The obtained results of our research, based on the analysis of strategic and regulatory documents, including lysis of publication activity, show a dramatic lag of Central Asian scientists not only in the field under study, but also in other areas.

Uzbekistan alone at the time of the study adopted a strategic document on the development of AI in the country. Nevertheless, Kazakhstan was the first to take care of the issues related to digitalization of all spheres of activity in the state and society. Moreover, the issues of financing research in the field of AI are also more related to the issue of state support, as well as the development of venture funds and the startup ecosystem, where Kazakhstan has also been identified as a leader among neighbors in the region.

We can assume that another reason for this lag of Central Asian countries in terms of publication activity is related to the fact that the number of scientific journals in Central Asian countries in the referenced databases of WoS and Scopus is minimal (Table 2).

Table 2 – Central Asian journals indexed in the WoS and Scopus databases (as of July 05, 2021)

Name	WoS/Scopus	Active or Inactive	Country
Eurasian Journal of Chemical Technology	W/S	Active	Kazakhstan
Eurasian Journal of Mathematical and Computer Applications	W/S	Active	Kazakhstan
Eurasian Mathematical Journal	W/S	Active	Kazakhstan
Eurasian Journal of Physics and Technology	W\S	Active	Kazakhstan
Series of Geological and Technical Sciences	S	Active	Kazakhstan
Bulletin of Karaganda University-Chemistry	W	Active	Kazakhstan
Bulletin of the Karaganda University-Physics	W	Active	Kazakhstan
Bulletin of Karaganda University-Mathematics	W	Active	Kazakhstan
Complex use of mineral raw materials	W	Active	Kazakhstan
Solar engineering	S	Inactive	Uzbekistan
Chemistry of Natural Compounds	S	Inactive	Uzbekistan
Healthcare in Kyrgyzstan	S	Inactive	Kyrgyzstan

Since the period of the study, a total of 12 journals included in WoS and Scopus databases were discovered in Central Asia, of which only 9 are active and are all located in Kazakhstan, and 3 are inactive, 2 are in Uzbekistan and 1 in Kyrgyzstan, WoS and Scopus [19,20].

On the other hand, perhaps the issues of financial support of publication activities are related to funding of the study area, and the funding associated with publication is insufficient. In addition, if we talk about the regional contribution to the development of AI, including those in medicine, through the analysis of publication activity, it remains insignificant.

Conclusion

According to the results of our study of the level of publication activity of Central Asian scientists in the field of AI, including AI in healthcare and medicine, there is a clear lag behind other regions in terms of the number of publications, citations and the overall Hirsch index in the field of AI, including AI in healthcare. The degree of maturity of the national strategy for developing AI and, in general, the digitalization of the Central Asian countries is also starting out. Nevertheless, over the past 5 years, scientists from Central Asian countries have become more active in terms of scientific research and publications in the field of AI in healthcare, but such activity is not homogeneously distributed across countries. There are clear leaders in the region in terms of publication activity – they are Kazakhstan and Uzbekistan. In general, the scientometric effectiveness of Central Asian scientists in the field under study may depend on the number of international scientific journals, the reviewed Scopus and WoS databases, the level of development of the country's digitalization, science funding and the development of the startup ecosystem.

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