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The proportion of coronary heart disease in development of chronic heart failure by retrospective analysis of three-year registry of hospitalization cases in tertiary healthcare institutions of Kyrgyz Republic

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Abstract

In this retrospective study, we analyzed epidemiological aspects and etiological structure of heart failure in tertiary cardiac hospitals of republic, namely National Center of Cardiology and SRI of Heart Surgery and Organs Transplantation in three-year follow-up from 2016 to 2018. Among all underlying disorders, the proportion of coronary heart disease predominated in heart failure conditions: 31.8% and 84.3% in I-II class and III-IV class groups classified according to New-York Heart Association, respectively.

Key words: heart failure, chronic heart failure, coronary artery disease, arterial hypertension, underlying disease, prevalence, functional class, morbidity, hospitalization case, retrospective study

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Introduction

Heart failure may result as a consequence of vast majority of cardiovascular conditions: any myocardial damages, rhythm disturbances and conduction defects, valvular heart disorders, pericardial diseases and etc. Almost all cardiovascular diseases or systemic conditions with cardiac involvement lead to heart failure (1, 2).

The definition of chronic heart failure (CHF) as proposed by heart failure guidelines of 2010 states that: ``Heart failure is a syndrome developed by malfunction of intracardiac filling and/or contractile mechanisms due to imbalance between vasoconstrictors and vasodilators, accompanied by inadequate perfusion of tissues and clinically manifested by typical symptoms: breathlessness, fatigue, palpitations and fluid retentions (edematous syndrome)`` (1).

Heart failure is characterized by high morbidity and mortality, reduced quality of life and substantial financial burden (3). The newly diagnosed events of heart failure constitutes more than half a million per year and it is estimated that 772000 newly diagnosed events will be supplemented by 2040 (3). In addition to clinically manifested heart failure, approximately 74 millions of people stay with risk factors, or diagnosed by stage A of heart failure (3). According to prevalence of cardiovascular diseases, heart failure occupies third place in United States. It's estimated that, in US five millions of people are suffering from heart failure and by 2040 prevalence of syndrome reaches to ten million (4).

According to 2016 European guidelines for management of acute and chronic heart failure, coronary heart disease (CHD) prevailed as etiologic factor of CHF, which is evidenced by investigations of developed North American countries (8, 9).

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As stated by researchers, underlying diseases of CHF varied by geographic regions. Most of the patients presented with both cardiovascular diseases and non-cardiac comorbidities (9). Hypertension and CHD remain as chief factors of heart failure development and progression in whole population. These two factors possess additive/synergic effect by enhancing the left ventricular remodeling and heart failure progression. The relative burden of heart failure due to these factors may depend on age, gender and race. Generally, considering the heart failure as the complication of only one of the two aforementioned diseases is inappropriate. Nevertheless, prevention of hypertension and ischemic heart disease plays a great role in heart failure prophylaxis in XXI century. Evidence states that, CHD (epicardial or microvascular; clinically manifested or subclinical) may lead to decreasing of myocardial perfusion (both acute and chronic) and subsequent myocardial damage and gradual deterioration of myocardial function (3).

Heart failure guideline of German primary medical care necessitates the importance of education and disease acceptance by patients for optimal compliance. Thus, educational programs concerning disease management and potential involvement of family in patient care play major role (5). Most of the patients with CHD do not fit to secondary prophylactic standards of guidelines due to cigarette smoking, unhealthy diet, and lack of physical activity, high body weight, obesity and high prevalence of diabetes. Risk factor control remains inadequate despite the high medicines consumption, which is significantly differed by centers in secondary prevention practice. Only less than half of patients with CHD enrolled in preventive and rehabilitation programs. All patients with coronary and vascular diseases necessitate contemporary programs of prophylactic cardiology properly adapted to medical and cultural conditions of each country in order to achieve better lifestyle, improvement of risk factor control and rationalizing the cardioprotective medications (6). Inadequate knowledge of patients about their disease is one of the challenges in implication of guidelines and preventive tasks.

In US, prevalence of heart failure varied by ethnicity, socioeconomic class and geography. The lower the socioeconomic status the higher rates of heart failure observed in case the cardiovascular risk factors controlled (7). About 80% of global cardiovascular diseases accounts to middle-income and low-income subjects (7).

We aimed to retrospectively analyze all hospital cases of chronic heart failure over three years in tertiary hospitals of Kyrgyz Republic and establish proportion of coronary heart disease and its characteristics.

Methods

We retrospectively studied and analyzed 38082 medical histories of adult patients regardless of age and sex hospitalized between 2016 and 2018 in cardiac departments of tertiary healthcare institutions of Bishkek: National center of cardiology and internal medicine (NCCIM), Scientific-research institute of heart surgery and organs transplantation, respectively (SRIHSOT).

For classification of heart failure in adults, we used CHF Classification system of New York Heart Association proposed in 1964 (10):

Statistical analysis: We used descriptive statistics to represent data.

	New York Heart Association classification (10)
Functional class (FC)	**Limitations of physical activity and clinical manifestations**
I	No limitations of physical activity. Ordinary physical exertion does not cause to weakness, dyspnea and palpitations.
II	Slight limitation of physical activity. At rest any pathological symptoms are absent. Ordinary physical activity is accompanied by weakness, fatigue, palpitations, breathlessness and other symptoms.
III	Marked limitation of physical activity. Only resting state supplies comfort for patient, but the slightest physical exertions lead to fatigue, palpitations, dyspnea and other symptoms.
IV	Impossibility to perform any physical activity without feeling of discomfort. Heart failure symptoms present at rest and pronounced by any physical exertion.

Results and Discussion

We retrospectively analyzed all hospital cases of CHF over three years in tertiary hospitals of Kyrgyz Republic and found that proportion of CHD prevailed as main underlying disease of heart failure by 71.89%.

A total number of hospitalized patients with CHF of various functional classes for 2016-2018 constituted 38082 patients (Table 1).

According to analysis, the main etiological factor of CHF I-II FC (Table 2) was CHD, predominantly in female patients. Far inferiorly to ischemic etiology, second and third places were occupied by arterial hypertension (AH) and diabetes mellitus (DM), respectively. At the same time proportion of

Table 1. Total number of hospitalized patients with CHF for 2016-2018

	2016	2017	2018	Total
NCCIM	11458	11539	11480	34477
SRIHSOT	1211	1196	1198	3605
Total:	12669	12735	12678	38082
CHF – chronic heart failure				

valvular pathology constituted only 0.85% with intra-group predominance of rheumatic origin (78% of cases). The interesting point from the analysis we concluded the rarity of other etiological conditions as, rhythm and conduction abnormalities, myocardial diseases, anemia, acute cerebrovascular syndromes, complications due to oncology and other diseases.

Table 2. The main underlying diseases of chronic heart failure in adult patients with I-II NYHA FC

Etiological conditions of chronic heart failure	All		Males	Females
	Absolute number	%	Absolute number	Absolute number
CHD	6482	31.85	2743	3739
AH	908	4.46	439	469
Adult congenital heart diseases	57	0.25	28	29
Cardiac valvular pathology of various etiology[1]	174	0.85	33	141
Cardiomyopathies of various etiology[2]	118	0.57	66	52
DM	791	3.88	422	369
Other disease	11817	58		
Total	20347			
*NCCIM data was used [1] congenital etiology was excluded, [2]ischemic factor was excluded AH – arterial hypertension, CHD – coronary heart disease, DM – diabetes mellitus, FC – functional class				

The main etiological disorders of CHF in adults with III-IV classes are highlighted in Table 3. As in groups of patients with I-II classes of CHF, but with markedly exceeding in percentage, in 84.34% of cases, causative condition was CHD. Valvular heart diseases (4.79%) gained the second place. When we looked into this group, rheumatic origin constituted approximately 60% and proportion of ischemic, degenerative origins became increased. Significant role is issued to adult congenital heart defects (ACHD) of both operated and non-operated categories and cardiomyopathies of various etiologies.

Table 4. The number of hospitalizations of CHD patients

	2016	2017	2018
All hospitalizations	12669	12735	12678
Number of hospitalizations due to CHD: **Number** **Percentage**	6492 52%	6813 54%	6865 55%
CHD – coronary heart disease			

The hospitalizations due to CHD make more than half of all hospital cases in cardiac hospitals of country. Nevertheless, ischemic causes tend to decrease, constant progression exists.

The main proportion of hospitalized (considering only tertiary-level hospitals) patients are residents of Bishkek city and Chuy oblast (oblast-administrative unit of Kyrgyz Republic, analogue of the region), where the percentage of emergent hospitalizations constitutes 32% in contrast to whole country, where it shows 12% (including the hospitalized patients of Chuy oblast) (Table 5).

Table 5. Distribution of hospitalized patients with coronary heart disease according to oblasts of country

Oblast	2016	2017	2018	All	
				Number	%
Bishkek	2038	2117	2082	6237	33.00
Chuy	1745	1884	1812	5441	28.83
Osh	261	304	307	872	4.62
Djalal-Abad	419	434	445	1298	6.87
Issyk-Kul	691	697	722	2110	11.18
Naryn	452	467	467	1386	7.34
Talas	274	276	304	854	4.52
Batken	212	234	226	672	3.56
*NCCIM data was used					

Table 6 highlights distribution of NYHA functional class groups of patients according to age. The significant difference between age groups was not detected in I-II FC and III-IV FC. Nevertheless, pathology in age group of 51-70 years prevailed in both CHF groups with 24.4% and 38.1%, respectively.

Table 6. The age distribution of hospitalized CHD patients according to CHF FC groups

Age (years)/ NYHA FC of CHF	I – II			Total		III – IV			Total	
	2016	2017	2018	N	%	2016	2017	2018	N	%
18 – 40	56	77	60	127	0.66	44	32	37	37	0.59
41 – 50	277	307	258	842	4.43	264	300	266	266	4.37
51 – 60	823	824	782	2429	12.80	1198	1153	1083	1083	18.10
61 – 70	681	740	782	2203	11.61	1369	1457	1523	1523	22.92
71 – 80	206	259	250	715	3.76	923	982	988	988	15.25
81 – 90	34	38	35	107	0.56	214	229	287	287	3.84
Elder than 90	-	3	21	24	0.12	3	11	12	12	0.13
Footnote: NCCIM data was used CHD – coronary heart disease, CHF – chronic heart failure, FC – functional class										

The distribution of CHD patients according to sex (Table 7) was obtained as follows: in I-II FC, female gender was predominated by 19.83%, whereas in III-IV FC male gender reliably prevailed.

Table 7. The gender distribution of hospitalized CHD patients according to NYHA FC groups

CHF FC	2016		2017		2018		Absolute number		%	
	male	female	male	female	male	female	male	female	male	female
I – II	890	1187	986	1263	878	1291	2754	3741	14.60	19.83
III – IV	2319	1696	2374	1790	2421	1775	7114	5251	37.71	27.84
CHD – coronary heart disease, FC – functional class										

According to Russian database, AH and CHD as underlying conditions of CHF development prevailed among etiological factors by 95.5% and 69.7%, respectively (1). Combination of these etiological factors is seen in most patients (1).

In Kyrgyz population, the leading cause of heart failure is CHD and its combination with AH makes up 71.89%, moreover percentage of combination has direct proportionality with functional class of CHF. Coronary heart disease stays as the global burden of our regions with 52-54% of all hospitalized conditions. According to age and sex predilections, middle age individuals and male sex is predominated: 37.715% in contrast to 27.84% of females. Due to geographic patterns (mountain area) of our republic, availability of qualified medical care for populations of remote regions severely limited and it's explained by scarcity of emergency admissions from oblasts (only 12%), and the most of them from nearby regions (Chuy and Issyk-Kul oblasts). In addition, the residents of regions represent lower percentage of planned admissions, probably associated with non-appeal for medical care. Ischemic heart disease brings severe economic damage to country by affecting the most able-bodied population and increasing of invalidation due to heart failure.

Conclusion

In studied population, the leading cause of heart failure is CHD, more often detected in middle ages and male patients. It is most often combined with arterial hypertension. Hospitalizations are mostly from urban areas and nearby regions.

Conflict of interest: None to declare

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