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The time to return to work and time of adaptation to social life of patients to whom primary or elective coronary angiography were applied

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Abstract
Coronary artery disease is one of the most common cause of death in the World due to factors such as the increase in mean age of communities and the bad eating habits brought by industrialization. After coronary angiography, invasive, surgery or medical treatment decisions are given for majority of patients. In this study we aimed to calculate the time to return to work and daily life after coronary angiography. The country's economies are affected adversyl by both treatment costs and labor force loss because of the disease.
We aimed to determine the time to return to the work and daily life in patients with a history of DM and HT, in elderly, in patients who were decided to taking in PCI or CABG, in patients with prolonged hospitalization, in patients with angina and dispnea.

Keywords: coronary artery disease, time of returning the work, cardiac rehabilitation

Introduction
According to data of WHO, it is estimated that Cardiovascular diseases will be the first reason for mortality and morbidity all over the World in 2020 [1]. Removing risk factors is very important as well as early diagnosis and treatment of cardiovascular disease in industrial nations. Cardiovascular diseases are very important for the economy of these countries because diagnosis and treatment of the disease is very expensive [2].

The factors affecting the time of returning to job are treatment time, complications of contrast agent and vascular access site, the cause of coronary angiography, hospitalization time, age, gender, comorbid diseases, drugs and sociocultural characteristics. While some of the studies about returning job after coronary angiography [3] say that age and gender can affect the results, some of them obtained results as nonsignificant [4]. In addition, it was found that the time to return to work was a mean of 4 weeks, while reduced ejection fraction (EF) significantly affected the time to return to work, whereas factors such as elective or primary angigraph were not significant. Atherosclerosis begins in the early decades, then results in coronary artery disease (CAD) which is one of the most common causes of death in the industrialized population [5]. According to some studies the frequency of angina increases proportionaly with age in both genders and while prevalence of angina in women is 5-7% between ages 45-64 years and 10-12% between 65-84 years, in men it is 4-7% between ages 45-64 and 12-14% between 65-84 years [6]. Symptoms are usually short-term and disappear with rest [7]. Considering that a productive economy depends on the labor force, the time to return to work is very important. Our aim in this study is to help to determine the optimal approaches that will cause the least labor loss by determining the average return to work process and revealing the factors affecting the return to work process.

Materials and Methods
Our study was conducted between March 2018 and October 2018 by applying questionnaire to the patients who had primary or elective coronary angiography decision in the cardiology clinic of Fırat University Medical Faculty Hospital, and by contacting the contact numbers given at the third month, asking the time to return to work and social life. The patients were grouped as STEMI, NSTEMI and Stable angina pectoris (elective). Angiographic results of the patients were evaluated by two experienced physicians. Patients were evaluated according to risk factors and general demographic characteristics of coronary artery disease. Patients' age, sex, diabetes mellitus (DM), hypertension (HT), smoking, alcohol, cerebrovascular disease (SVH), chronic renal failure (CRF), ischemic heart disease (HRC), heart failure (HF), pace history (DEVİCE), angina, dyspnea, dizziness symptoms, occupation, education status were asked after coronary angiography (CAG). Total hospitalization time of the patients was recorded and Echocardiography (ECHO) was taken and Ejection fraction (EF), valve pathology, pulmonary hypertension and routine diameter measurements were taken.

Exclusion criteria
- Patients who have not undergone to coronary angiography and who was decided to followed up medically
- Patients without contact numbers.

Statistical analysis
Data were analyzed with Windows SPSS software version 22.0. Descriptive statistics were used for values such as frequency, mean, standard deviation, median, and range. Chi-Square test was used to compare the qualitative variables between the independent groups of more than three groups and the expected values were smaller than five in the evaluation of the study

groups according to different variables. The sample T-test was used to determine the significance of the difference between two means in two independent groups. ANOVA was used to compare more than three independent groups. All statistical analyses were performed using SPSS software. To be statistically significant, the p-value was accepted as less than 0.05 for all data.

Results

When we look the distribution of the age the youngest patient was 23 years and the oldest was 94 years old. The mean age of the patients was 61 ± 12.7 years. The distribution of age is not normal.(Figure 1)

In this study, Patients are divided into three groups according to their diagnosis.(Figure 2)

We see that adaptation to daily life and work takes place faster in younger patients.(Table 2)

When the demographic characteristics of the patients were considered, it was observed that individuals with a history of HT and IHD had a later return to work.(Table 3)

There was no correlation between the severity of admission and return to work or social life. The data we obtained were that the patients who underwent elective CAG made a business plan so that they could spend time for rest, while the patients who had STEMI could not comply with the recommended period of rest due to the lack of preparation due to the emergent emergency and the low socioeconomic level in which they were present. (Table 4)

It was seen that invasive procedures such as PCI or decision of coronary artery bypass surgery caused prolongation of patients' return to work and the earliest return to work was seen in NKA group.(Table5)

After CAG, return to work was found to be late in patients with angina and dyspnea, but was not associated with dizziness. (Table 6)

There was no significant relationship between retirement and housewives' time to return to social life and their current status, on the other hand, there was no significant relationship between working as a civil servant or worker and returning to work. (Table 7)

The p-value of the relationship between education level and time to return to work is 0.202 and is not statistically significant. There was no significant relationship between education level and time to return to work. (Table 8)

Return to work is also prolonged in patients with extended hospital stays. (Figure 3)

Table 1: Demographic and clinical characteristics of the general population

Demographic and clinical features	N	Percent %
DM	108	31,0
HT	169	48,6
Cigarette	141	40,5
Alcohol	11	3,2
CVD	22	6,3
CRF	39	11,2
İHD	149	42,8
PACE	6	1,7
HF	42	12,1
STEMI	70	20,1
NSTEMI	55	15,8
ELECTIVE CAG	223	64,1

Table 2: Comparison of demographic and clinical characteristics according to the presence of coronary artery disease.

Age	≤40	41-59	≥ 60	P value
The time to return to work	6,8	11,6	12,7	0,021

Table 3: Relationship between demographic characteristics and return to work

Demographic and clinical features	The time to return to work	P value
Gender (F/M)	11,2/13,3	0,218
HT	14,7	<0,01
DM	13,7	0,140
Cigarette	11,4	0, 594
İKH	14,3	0, 012
Alcohol	6,1	0, 195
CRF	10,9	0, 425
CVD	17,3	0, 091

Table 4: Relationship between application diagnoses and return to work and daily life

	Stemi	Nstemi	Elevtive Cag	P value
The time to return to work	10,3	12,6	15,2	0,597

Table 5: Correlation between decision-making after coronary angiography and return to work and daily life

	PCI	MTD	NCA	BY-PASS	P
Number of patients	176	74	88	10	-
The time to return to work	13,9	10,4	4,0	54,2	<0,01

Table 6: Relationship between ongoing symptoms and return to work and daily life after CAG

Symptoms after coronary angiography	The time to return to work	P value
Angina	18,5	<0,01
Dyspnoea	20,5	<0,01
Dizziness	8,9	0,378

Table 7: Relationship between patients' occupational status and return to work and daily life

Job	Number of patients	The time to return to work	P
Retired	135	11,2	0,506
Housewife	51	12,9	0,668
Officer	31	7	0,055
Worker	131	13,7	0,210

Table 8: Relationship between education level and return to work and daily life

Level of education	The time to return to work	P
Illiterate	14,5	0,180 0,180
Only literate	13,6	0,505
Primary school	13,1	0,306
Middle School	10,3	0,417
High school	8,7	0,079
High education	9,1	0,303

Table 9: Relationship between ejection fraction and return to work and daily life

	EF ≤%40	%41-49	≥%50	P value
The time to return to work	12,3	11,5	13,2	0,884

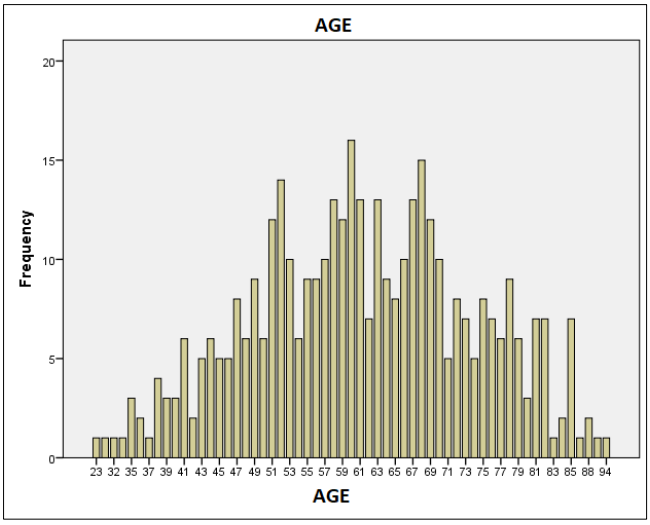

Fig 1: Age distribution of patients

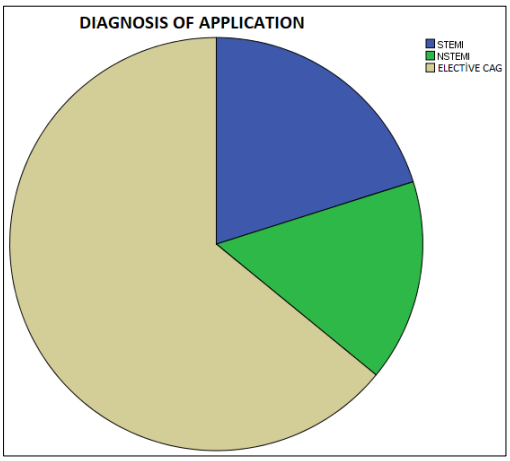

Fig 2: Distribution of patients according to their diagnosis

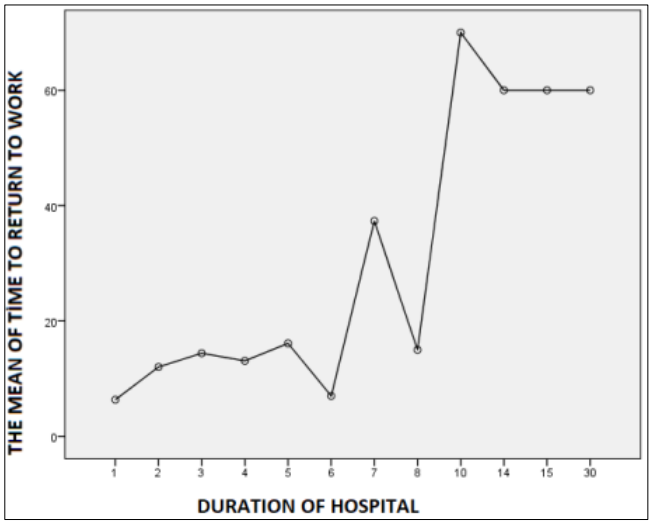

Fig 3: Distribution of return-to-work time according to a length of hospital stay (The p-value of the relationship between the two factors is <0.01 and is statistically significant).

Discussion

One of the most objective indicator of coronary artery disease treatment is that patients can return to work and achieve their previous living standards. Failure of patients to gain previous activity capabilities will cause loss of self-confidence and loss of financial gain. The aorta-coronary by-pass surgery (CABG), percutaneous coronary intervention (PCI) and percutaneous coronary angioplasty (PTCA), which are used for the treatment of coronary artery disease, are expensive procedures and with these the emergence of the factors that prevent the return of the patients to the work creates economic high costs. Preservation of left ventricular functions and absence of effort angina are important factors in patients' return to work and their adaptation to social life in patients presenting with the acute coronary syndrome. After an uncomplicated myocardial infarction, return to work was 2 weeks on average in light office conditions, 3 weeks for arm workers, and 6 weeks for heavy-duty workers. Although a small number of patients have been reported to return to work earlier, the average time to return to work after acute myocardial infarction worldwide is 50 days. However, it should not be ignored that there are serious differences between countries. Important factors in returning patients to work include age, gender, educational status, occupation, previous myocardial infarction (MI), MI width, residual angina, low left ventricular functions, and low exercise capacity. Other factors such as psychological status, the presence of health insurance, unemployment benefits and working conditions are also important. Compared to other factors, medical factors seem to play a small role in returning to work. It is also important to identify the factors that may cause the recurrence of cardiac events against the economic benefit of early return to work.

In this study, we investigated the factors affecting the return of 348 patients to work and previous standards of life, who were admitted to the cardiology clinic for ACS or stable angina and ultimately underwent primary or elective angiography.. Similar studies have been done before and average values have been revealed. However, different results have emerged as a result of the researches performed by each country and clinic. In our study,

unlike other studies, active employees were asked to return to work, while individuals who were not actively involved in business life such as housewives or retirees were asked to return to their previous activities.

Herlitz *et al*. [8] in a prospective cohort study of myocardial infarction under the age of 65 full-time or part-time working patients were studied and a total of 921 patients were taken as a mean age 72 (16-98) and in total 49% of patients returned to work after MI. After MI, 37% of full-time workers returned to work, while only 12% of part-time workers returned to work. It is stated that advanced age and large infarcts adversely affect return to work. In our study, the total number of patients with AMI was found to be 125 patients. In our study, it was seen that all pre-CAG workers returned to work and therefore it was thought that the time to return to work was more important for our population and the periods were compared. In all groups, it was revealed that the time to return to work was later in advanced age.

In the studies of Maeland *et al*. [9 10], 249 patients under the age of 67 were followed up for 6 months after acute myocardial infarction, and 2% of the patients had this period on leave due to illness. A total of 72.7% of the patients returned to work during this period. As a result of the analysis, it was stated that return to work was adversely affected in advanced age, low education level, rural people, high work stress, anxiety, depression and low self-confidence. In our study, it was observed that the level of education had no significant effect on the time to return to work. The insufficient number of patients at different educational levels and the resulting statistical insignificance explain this weak relationship.

Soejima *et al*. [11] performed a study about return to work after myocardial infarction in, full-time employment male Japanese patients who had myocardial infarction for the first time. Patients were reached by mail or telephone at the 8th month and 83% of the patients returned to work within 8 months. In total, 134 people were included in the study and the mean age was calculated as 54.3. The most important factors that negatively affect the return to work were depression and anxiety about one's illness.

In our study, patients were not asked questions about their commitment to work, their emotions, anxiety caused by the disease, and income levels. Future studies were considered to be more powerful with these questions..

Although acute myocardial infarction recommendations, treatment techniques and medical therapies improved the patient's clinical status, it was not found to be effective in determining the time to return to work and daily life. It is thought that medical, psychological and socioeconomic factors should be evaluated in a multidisciplinary manner in return to work and daily life. Although cardiac rehabilitation programs shorten the time to return to work, it is seen that there is no clear benefit on the return to work period considering the transportation cost and loss of time for the patients living in rural areas.

It was found that 59% and 100% of the patients who had been working before coronary artery bypass surgery(CABG) had returned to work after surgery [12 13]. However, the average rate of patients returning to work was shown to be 75%.

In the prospective PERISCOP study [14], 530 patients underwent CABG and were followed-up for a mean of 12 months and 67.55% returned to work. The average time to return to work was shown to be 3.2 ± 2.2 months and was generally said to be 3 months. At the same time, it was shown that the number of coronary arteries affected by the disease did not affect return to work, total revascularization was performed in 78.2% of those who returned to work and 75% of those who could not return to work, and the relationship between the two was not statistically significant and there was no significant relationship between the return to work and detected arrhythmia, while patients with advanced age, dyspnea complaints and short exercise duration had negative effects on return to work.

A total of 213 patients were included in the return to work after CABG study conducted by Speziale *et al*. The mean follow-up was 38 months and 78.7% of the patients returned to work [15]. 78.3% of patients under 50 returned to work, while only 60.7% of patients over 50 returned to work. At the same time, it was stated that the return to work of patients with the low socioeconomic level was negatively affected. Advanced age and low socioeconomic status have been shown to adversely affect return to work.

In our study, the average time to return to work was 54.2 days in patients with CABG decision, and similar results were obtained with other studies. Also, the ongoing dyspnea complaints after PCI and CABG decision were questioned and the meantime to return to work was shown to be 20.5 days in these patients, and the relationship between dyspnea and return to work was statistically significant. It has been observed that persistent dyspnea and advanced age adversely affect the time of return to work and cause later returns to work.

Some of the return to work studies after coronary artery by-pass surgery (CABG) indicated that DM was an important factor [16] and the results were insignificant in some studies [17]. It has also been shown in some studies that the history of acute myocardial infarction is not an effective factor at the time of return to work after CABG [14]. A study by Mark *et al*. revealed that peripheral arterial disease adversely affects return to work after CABG [18]

DM did not have a clear effect on the time of return to work in our study. No significant differences were observed in the time of return to work because no complications related to DM were observed in our patients.

136 patients who underwent CABG were included in a study by Boudrez and De Backer [19]. 81% of the patients followed up for 12 months returned to work. The mean ejection fraction (EF) of the patients returning to work was 71 ± 12%, whereas the mean EF of those who could not return to work was 62 ± 18% and the relationship between EF and return to work was statistically significant. As a result, preserved left ventricular function is a positive factor that facilitates return to work.

In our study, unlike other studies, it was shown that the ejection fraction did not have a significant effect on the time of return to work but only sustained dyspnea harmed return to work. It has been shown that if the clinical status of patients with low EF is deteriorated, the return to work will be adversely affected and if there is no symptom and clinical pathology, there is no significant difference between them and other patients.(Table 9)

In the return to work after CABG study by Skinner *et al*. 353 patients were included in the study, followed up for 12 months, and 84% of the patients returned to work [20]. Angina has been shown to be a factor that adversely affects return to work.

In our study, the meantime to return to work was 18.5 days in patients with persistent angina after PCI (PCI and CABG) and the

relationship between angina and return to work was statistically significant. Ongoing angina has been shown to adversely affect patients' return to work, leading to later returns to work.

In the randomized intervention treatment of angina (RITA) study, the return rates of CABG and PCI patients were compared [21]. In Bypass Angioplasty Revascularization Investigation (BARI) study [22], the return rates of CABG and PCI patients were compared and similar results were found with the RITA study.

In our study, it was seen that the time to return to work of CABG patients was similar to other studies, while earlier returns in the PCI arm took place, shortening of the processing time with improved stent and balloon technology, and the fact that revascularization was performed under optimal conditions with an experienced team contributed greatly to this process. On the other hand, it is an undeniable reality that the patients kept this period shorter despite the physician's recommendations due to economic reasons in our country conditions. In our study, all patients were divided into groups as retired, housewives, civil servants and workers. There was no significant relationship between retiredes and housewives' time to return to social life and their current status however, there was no significant relationship between working as a civil servant or a worker and the time to return to work. It was shown that the data obtained from other studies were similar.

Conclusıon

This study is the first in Turkey about the time to return to work and return to daily life after the KAG. We should say in particular that there is no standardization regarding the time of return to work in our country. Based on the data obtained from patients with acute coronary syndrome or stable angina who underwent CAG; A total of 162 patients, 31 of whom were civil servants and 131 were workers, were found to have returned to their jobs. On the other hand, the time to return to work was longer in CABG and PCI arm depending on the procedure. It was observed that the education level did not affect the time of return to work. It was found that the time to return to work was later in patients with a history of HT and İHD. No significant relationship was found between EF and time to return to work. It was found that the symptoms that affect the comfort of life such as dyspnea caused by cardiac dysfunction are more effective on the return to work and prolong the duration rather than the quantitative EF value of the patients. It was also found that prolonged hospital stay, regardless of the cause, caused prolonged return to work and previous daily life. It was also observed that angina and dyspnea, which persist after CAG, negatively affected the time to return to work. It was seen that the time to return to work was later in older patients and younger patients were adapted to life earlier after CAG. In our country, it was seen that the return of the patients to work was much earlier than the other countries after AMI, it was predicted that the patient could not be provided with sufficient information and that the patient had underlying financial concerns.

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Declaratıon of Interests

The authors declare no conflict of interests.

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