



ERGONOMIC RESEARCH ACTIVITIES OF BELIEVERS AND ATHEISTS WHO ARE EMPLOYED IN THE SAME FIELD

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SUMMARY:

In this work are described the basic elements man – environment – believer. The system has been studied and analysed through very widely, starting from the conditions in which the chosen subjects worked, up to their working postures they used, which are considered as a very important matter from the biomechanical, as well from the medical point of view,

This work results with new information. The results are given in tables and accompanied diagrams

KEYWORDS:

atheists, believers, productivity, work injuries

1. INTRODUCTION

By searching through the existing literature about comparison of work activities between believers and atheist who work on similar jobs was concluded that extensive research in this field had not been done. This article presents research work, which produced some results to this very complex question. The work is interdisciplinary and includes wide spectre of research assistances from different fields:

- ✚ PhD Civil Engineer
- ✚ Medicine Pneumatology Specialist
- ✚ PhD Sports and Culture
- ✚ MSc Psychologist

2. RESEARCH GOALS

Human physical activity that follows motivation of locomotors and muscular system has its mechanical equivalent. A man produces energy in its body and spends it in doing mechanical work. The function of human nerve system is to get information, to process and finally to coordinate all these activities.

According to these functions of human body systems, the research goals of this article are set to define overall system status in evaluating complexity of physical activities. In the existing literature was not possible to find answers to these questions. This presents “*pioneering enterprise*” of activities comparison of groups of people who are believers and who are atheists. The goal of the article is extended to research of new comparison rules. According to existing literature human activities is possible to study human activities in two ways:

- ✚ Trough energy method,
- ✚ Physiology approach of mechanical activities analysis

Energy method includes estimating percentage of energy consumption and energy usage in a frame work of the job activities. This used to be measured in kilocalories (Kcal), but now days it is expressed in joules (j), kilojoules (kj). A used energy was often presented in daily amounts and sometimes by hourly or minute intakes. It is clear that in this kind of work analysis is impossible to have information about side effects on an employee or the way how different forces influence on the work quality.

Physiology analysis approach is a method closer to needs of this project. This method is based on measurement of body tiredness of an employee, which is based on quantity of oxygen intake per completion of specified task. In the case if the analysis was not given in this way then data estimated was presented through experimental analysis.

As the third part productivity will be presented in the function of injuries at work for the two groups analysed.

3. TESTING SAMPLES

- a) The analysis was done in the company FAMOS, Sarajevo in the period 1985-1990. There had been involved two groups of 15 men who worked on two gearbox assembly lines. One group of employees were atheist and the others believers. Both group productivities and number of injuries at work were monitored. All employees were in average around the same age.
- b) Analysis was done in the sports club in Sarajevo. There had been involved two groups of 15 male participants in age between 21 and 22 years, the same physically built. One group of 15 sportsmen atheist had exercises in the gym exactly in the same way as the other 15 sportsmen believers. Both groups were questioned and anamnesis data were taken for all tested employees.

Measurement conditions, barometric pressure and space temperature were identical for both samples a) and b). Load setting and load control on the treadmill during analysis was calculated on the basis of external (physical) and internal factors. External loading factors are indicators of amount of load:

- ✚ activity duration,
- ✚ breaks counting,
- ✚ counting of repeating exercises,
- ✚ path length during walking,
- ✚ running etc

Internal loading factors are indicators of reaction of some of human body systems and human body as a whole during changes of load:

- ✚ heart beat frequency,
- ✚ breathing frequency,
- ✚ concentration of milk acid in the blood,
- ✚ arterial blood pressure etc

During 12 minutes test exercise *average* and *total air consumption* was measured for the both groups. All sportsmen were sampled on a treadmill where speed was changed from slow walking to full sprint. By changing treadmill gradient uphill running was simulated. The speed during examination was predetermined by testing conditions, which were set to bring sampled sportsman to the point of exhaustion, while he was giving his the best effort. All sampled sportsmen were given exactly the same 12 minutes test exercise.

An EKG, heart beat and blood pressure were continuously monitored in the case of any overloading. On the first sign of heart exhauster the testing was stopped. By comparing results of EKG, blood pressure and breathing conclusion was made whether sampled man reached his ability limit.

Another testing was performed by measuring sampled sportsman amount of air breathed out while he was running on the treadmill and breathing into a valve with one entrance. The collected air was analysed to find out the amount of used oxygen, which was consumed during exhaustion. Oxygen amount measured in millimetres per kilogram of body mass in one minute presents human aerobic capacity, which is proportional to a body capability.

Heart beat was measured before and after exercise for the both groups of sampled men. A heart beat is physiological loading reference which gives the most useful information during exercise.

4. RESULTS

Work productivity on the gear box assembly line in the period 1985-1990 in the Gear Box Factory FAMOS.

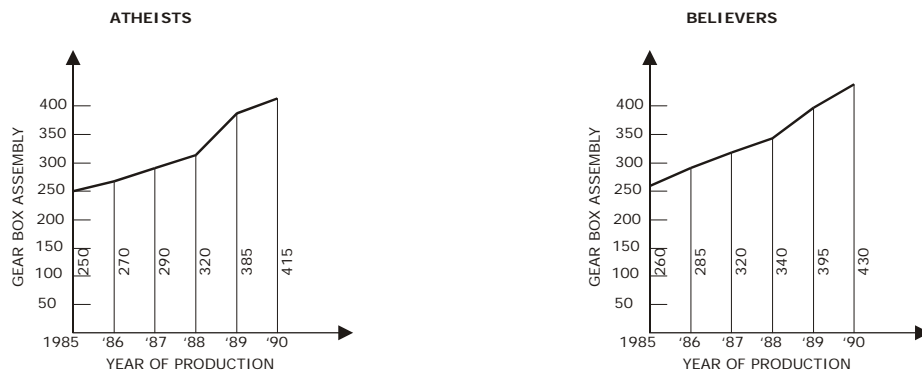


Figure 1: Comparative analysis of productivity between atheists and believers

Number of work related accidents in the gear box assembly line in the period 1985-1990 in the Gear Box Factory FAMOS.

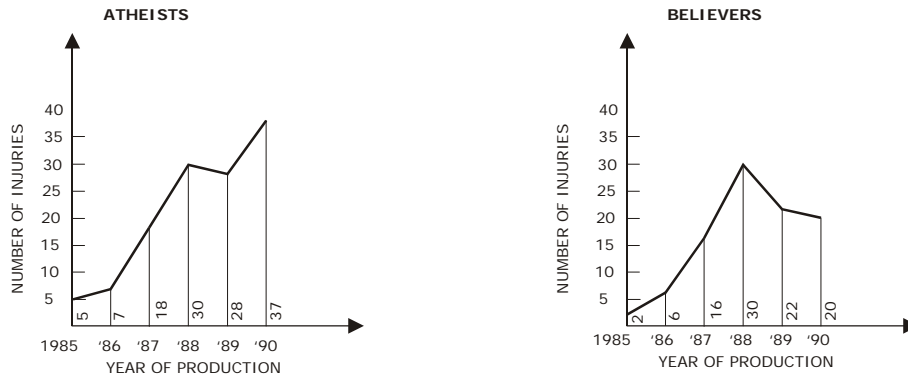


Figure 2: Comparative analysis of work injuries between atheists and believers

According to the *Figure 1* is possible to conclude that average productivity of believers is for 6% higher than of atheist, while according to *Figure 2*, the number of work related accidents of atheist is for 7.7% higher than of believers.

Table 1: Believers

Num.	Sampled man	Age	Path length reached [m]	Load time [min]	Oxygen usage [ml/kg/min]	Total oxygen usage for 12 minutes	Heart beat level at start [1/min]	Heart beat level at the end [1/min]	Average heart beat [1/min]	Maximum heart beat Fc max - GS
1	A.K	20	2400	12	38	456	66	160	113	200
2	B.S	22	2400	12	36	432	64	156	110	198
3	R.P	21	2400	12	34	408	68	162	115	199
4	R.S	22	2400	12	35	420	70	165	117.5	198
5	P.L	20	2400	12	33	396	65	161	113	200
6	M.N	21	2400	12	37	444	62	166	114	199
7	M.S	20	2400	12	32	384	72	159	115.5	200
8	K.S	22	2400	12	30	360	70	157	113.5	198
9	F.V	21	2400	12	36	432	69	159	114	199
10	E.P	20	2400	12	35	420	64	164	114	200
11	H.S	21	2400	12	39	468	68	161	114.5	199
12	H.K	22	2400	12	38	456	66	163	114.5	198
13	M.P	20	2400	12	31	372	69	165	117	200
14	J.R	22	2400	12	33	396	62	161	111.5	198
15	N.M	21	2400	12	35	420	66	162	114	199
Pr.	N.N	21	2400	12	34.8	417.6	66.73	161.4	114.06	199

Table 2: Atheists

Num.	Sampled man	Age	Path length reached [m]	Load time [min]	Oxygen usage [ml/kg/min]	Total oxygen usage for 12 minutes	Heart beat level at start [1/min]	Heart beat level at the end [1/min]	Average heart beat [1/min]	Maximum heart beat Fc max - GS
1	R.M	20	2400	12	37	444	67	154	110.5	200
2	P.K	21	2400	12	39	468	66	162	114	199
3	S.L	20	2400	12	36	432	68	168	118	200
4	J.N	22	2400	12	37	444	68	171	119.5	198
5	L.D	21	2400	12	39	468	65	165	115	199
6	V.T	20	2400	12	41	492	64	171	117.5	200
7	Š.K	22	2400	12	38	456	66	166	116	198
8	R.M	20	2400	12	37	444	68	160	114	200
9	M.S	21	2400	12	39	468	63	175	119	199
10	P.R	20	2400	12	42	504	64	172	118	200
11	S.L	22	2400	12	40	480	66	159	112.5	198
12	A.V	21	2400	12	35	420	68	164	116	199
13	K.A	22	2400	12	39	468	67	160	113.5	198
14	I.F	20	2400	12	40	480	65	156	110.5	200
15	R.I	22	2400	12	38	456	66	162	114	198
Pr	P.P	20.9	2400	12	38.47	461.6	66.07	164.03	115.02	199.1

According to the *Table 1* and *Table 2* is concluded that for the same amount of work an average sampled man “Believer” uses 10.5% less oxygen than average sampled man “Atheist”. An average sampled man “believer” has slower heart beat for 0.9% than sampled man “Atheist”.

5. CONCLUSION

In the presented work has been shown that overall performance of the “Believers” groups had been much better than performance of the “Atheists” groups. If in the further more extensive and more detailed research will confirmed the same results than it can be served as a safe way to extend length of high quality worker life:

- ✚ Less sick leaves
- ✚ Better productivity
- ✚ Better ratio of used work force per the same completed work

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