DOI: 10.7251/SSH1802117L
Original scientific paper

UDC: 613.72/.7:618.88-055.1
Originalni naučni rad

Physical Activity and Sexual Health in Men

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Abstract: *The primary aim of the study was to examine the correlation between the physical activity level and three factors of sexual health in men (sexual desire, sexual function and sexual satisfaction). The sample consisted of 509 male students aged 18 to 30 (M=19.70; SD=1.38). The results suggest a significantly better erectile function and sexual satisfaction in sufficiently physically active compared to insufficiently physically active men, while no significance was found in sexual desire and premature ejaculation. The findings indicate that the level of physical activity is positively related to sexual health factors, regardless of whether the dominant aerobic or anaerobic type of physical activity is practiced. Men with higher number of exercise hours on weekly basis have higher sexual desire and better erectile function. Men who are more satisfied with their own body image, have better erectile function. Although previous studies point to positive correlation between physical activity and sexual health in older age groups, this study points to better sexual health of physically active men already in the student age.*

Keywords: *exercise, sport, sexual desire, erectile function, sexual satisfaction.*

Introduction

During the past decades, a certain number of studies indicated a positive correlation between physical activity and sexual health (Leoni et al., 2014; Leško et al., 2016). Sexual difficulties involve frequent problems which cause stress and/or dissatisfaction in sexual life (Basson et al., 2000). They may be organic, psychosocial, developmental, personal or interpersonal aetiology, as well as their combination. The importance of sexual health quality and its research is reflected in the results of studies, which indicate that the quality of sexual function is of significant importance in the overall quality of men's life (Wilcox et al., 2014). From a biological point of view, sexual reactions are the consequence of a coordinated activity of the sympathetic system, parasympathetic system and somatic innervation driven by complex emotional and cognitive stimuli, as well as those related to the context which are processed in the limbic part of the forebrain (Purves et al., 2011). A hypothalamus, which integrates information from the forebrain, truncus encephali, spinal cord, and intrinsic chemo sensitive neurons, is important in regulating sexual function. Important roles in sexual functioning and behaviour have hormonal regulation and function of neurotransmitters. Testosterone is considered a hormone with a significant effect on libido in women and men (Basson et al., 2010; Isidori et al., 2005). Other hormones such as estrogens and progesterone are also present in both genders. The most common sexual disturbances in men are sexual desire disorder, erectile dysfunction and premature ejaculation, with less comorbidity compared to women (McCabe et al., 2016b). In the aetiology of hypoactive sexual desire is often hormonal imbalance (Bartlik et al., 2010), mainly low testosterone and high prolactin, imbalance of inhibitors and excitators (Janssen & Bancroft, 2006), as well as stress, interpersonal difficulties, certain psychological problems such as depression or mood disorders, and taking certain medicines. Also, lack of sexual desire may be caused by the physical inability of a partner. There are many potential causes of erectile dysfunction such as nerve damage, hormonal imbalance, previous surgery, diabetes, the use of drugs such as antidepressants, and are also often psychologically conditioned (mental difficulties, stress, anxiety associated with sexual activity, dissatisfaction with one's own body image, etc.). Erectile dysfunction shares risk factors with cardiovascular and metabolic diseases, and is often associated with lifestyle factors such as sedentary lifestyle, cigarette, alcohol and drug consumption. The causes of

premature ejaculation are still not clearly confirmed and are associated with drastic increase of hormone levels and/or neurotransmitters, anxiety, depression, previous sexual experiences etc. (Gajjala & Khalidi, 2014; McMahon et al., 2016). In the practice of sexual psychotherapy, the estimate of sexual satisfaction is one of the standard indicators of sexual health (Graziottin et al., 2006). Sexual satisfaction is a measure of satisfaction with sexual life, which includes different factors. Štulhofer & Buško (2008), whose instrument for assessing sexual satisfaction was used in this study, have explained sexual satisfaction as a complex construct of five dimensions: sexual feelings/experience, sexual focus, sexual intercourse, emotional attachment or closeness/intimacy, and sexual activities.

By comparing the results of recent studies, McCabe et al. (2016a) estimate the prevalence of erectile dysfunction to 1%-10% in men under 40. According to Selvin et al. (2007), erectile dysfunction affects approximately 18 million men in the United States (18.4%). PE is often considered a more frequent difficulty than erectile dysfunction. The prevalence of PE is usually 8% to 30%, observing all sexually active age groups (McCabe et al., 2016a), and according to some authors is estimated at 20-40% (Althof et al., 2014; Kalejaiye et al., 2017). Prevalence of hypoactive sexual desire of men is estimated at 15% to 25% at age up to 60 (Corona et al., 2005; Moreira et al., 2006; Nicolosi et al., 2004; Nolazco et al., 2004), after which it is further increased (Korfage et al., 2008). Analysing sexual function in adolescents and young adults, at least one sexual problem was observed in 51% of Canadians between the 16 and 21 (O'Sullivan et al., 2014). Data on prevalence of sexual disorders in Croatia point to a significant number of men facing sexual disturbances, with significant incidence of such disorders in the youth as well. According to Ivanković et al. (2015), male heterosexuals aged between 18 and 28 had the following difficulties: lack of sexual desire (28.8%), PE (22.7%), and erectile dysfunction (17.2%).

Examining the causes of sexual dysfunction in men, seems that some of them may be reduced by regular physical activity or exercise. Some of the causes of sexual problems such as low testosterone, imbalance of other hormones, stress, anxiety, depression, mood disorders, body image dissatisfaction, diabetes or obesity, may be prevented and reduced by regular physical activity (Barić et al., 2014; Hughes, 1984; Mišigoj-Duraković et al., 1999). Some of the immediate effects of physical activity and exercise include reducing fat tissue, improving physical condition, better coronary blood flow, endothelial and cardiorespiratory function, and triglyceride and hypertension reduction (Vina et al., 2012). There are many indirect effects of physical activity in primary and secondary prevention of cardiovascular and metabolic diseases such as diabetes, which are also some of the causes of sexual dysfunction. Physical activity and fitness are not important only for preserving quality sexual function. Physical fitness may also be important for the quality of sexual intercourse (Kalka et al., 2013). The psychological and interpersonal effects of physical activity and exercise are found to increase self-confidence, reduce anxiety, depression, fear and tension (Hughes, 1984), reduce stress, increase self-esteem and socialization (Bungić & Barić, 2009), increase the feeling of competence (Sallis et al., 2000), and a positive effect on mood and sleep quality (Vina et al., 2012). Physically active Croatian teenagers have fewer incidencies of anxiety/depression, reticence, somatic difficulties, social problems, and problems of attention (Greblo et al., 2014). Physically active male students are more satisfied with their working abilities, energy level, rest and lower levels of discomfort, pain and fatigue (Barić, 2017). Higher levels of anxiety and depression symptoms were observed in male adolescents with a lower physical activity level (Barić et al., 2014). Observing sport, according to Barić & Greblo (2012), the positive influence of sport may be observed in the development of positive characteristics and habits (self-esteem, self-confidence, persistence, goal orientation and perseverance). It may be expected that men who practice exercise and have good physical condition will have better self-esteem and body image satisfaction, which may reduce the number of stress factors when initiating sexual intercourse, but also ensure the experience of a pleasant sexual intercourse, deprived of thinking about distractors, such as thinking about how a partner sees his body. The relationship between physical activity and various factors of sexuality has been recognized and tested in a certain number of studies, most of which point to a positive association between physical activity or exercise and the level of sexual desire, the quality of sexual function and sexual satisfaction in both genders (Leško et al. 2016). Many studies recommend physical activity as an effective non-invasive and non-pharmacological prevention method for sexual difficulties and, in combine with medical treatment and medication, reduction method of already existing sexual dysfunction (Leoni et al., 2014; Leško et al., 2016). Due to global lack of research on correlation between physical activity and sexual health in people without diagnosed sexual disturbances, and on a sample of athletes, the primary aim of this paper was to examine the correlation between the physical activity level and three factors of sexual health (sexual desire, sexual function and sexual satisfaction). Also,

the correlation between the number of training hours on weekly basis and the sexual health factors, and the correlation between body image satisfaction and sexual health factors, were examined.

Method

Out of total 705 shared questionnaires, the sample consisted of 509 male students aged 18 to 30 (M=19.70; SD=1.38), from six faculties of the University of Zagreb who completed the questionnaire in full (response 72.19%). In the total sample there were 91.55% heterosexuals and 74 athletes. The research was conducted according to the ethical principles of scientific research. The data were collected by filling the standardized questionnaires: International Physical Activity Questionnaire short form (IPAQ-SF, Craig et al., 2003), New Sexual Satisfaction Scale short form (NSSZ, Štulhofer & Buško, 2008), Figure Rating Scale (FRS, Stunkard et al., 1983), an indicator for sexual desire (Štulhofer et al., 2016) with the question: *"Thinking about a typical week in the last 2 months, mark the level of your desire for sexual activity."* (scale 0-10, higher number indicates a higher level of sexual desire), and indicator of premature ejaculation (Štulhofer & Bajić, 2006) with the question: *"How often do you ejaculate in less than two minutes from the beginning of penetration into your partner?"* Participants have selected one of four responses. The survey also contained questions about general data and specific topic-related data (age, self-assessment of competition rank for the athletes, number of sport or recreational training hours on weekly basis, sexual orientation, estimation of the intensity of increasing sexual desire during and after the sport or recreational training, frequency of sexual intercourse and masturbation in the last two months). One question was only for recreational practitioners (dominant type of training: aerobic/anaerobic; the descriptions of each category are listed, with examples of activities which describe them). The sample was divided by the physical activity level criterion. The results of the IPAQ-SF questionnaire enabled participants to be categorized into one of three categories per physical activity level on weekly basis: insufficient physical activity (0-600 MET-min), minimal physical activity (601-3000 MET-min) and sufficient physical activity (>3001 MET-min). In purposes of some analysis, men who practice recreational exercise and the athletes are specifically marked. For all variables, basic descriptive parameters and Kolmogorov-Smirnov test were calculated. Mann-Whitney U test for the independent sample and series of linear bivariate regression analysis were used. One-way ANOVA and Tukey's HSD Post-hoc test were used for calculating statistical significance of mean age difference between groups of insufficiently, minimally and sufficiently physically active men.

Results

The average physical activity level was 51.41 MET/week (MDN=41.00). There were no significant differences of mean age between the groups of insufficiently, minimal and sufficiently physically active men. In 50.29% physical activity level is sufficient, in 35.16% minimal, and in 14.53% insufficient. In the further processing of the data, the physical activity level is dichotomized to sufficient (sufficient physical activity level) and insufficient level of physical activity (insufficient and minimal physical activity level) to form two groups, insufficiently physically active and sufficiently physically active men. Such a concept showed a sufficient level of physical activity in 50.29% and insufficient in 49.70% of men. Out of all physically active men, 68.35% are recreational practitioners, 28.90% athletes, and 2.73% of those who do not practice exercise. In the athlete's sample, 56.75% are competing on the County, 33.78% on the State, 9.45% on the International level, and their distribution according to sports was the following: football (34); basketball (12); handball (5); track and field, volleyball, swimming, tennis (3); Australian football, badminton, body building, golf, karate, rugby, shooting, taekwondo, Thai boxing, water polo, rowing (1). The average number of training hours on weekly basis in the total sample of men who practice exercise was 6.42 (5.54 in the recreational practitioners, 8.58 in athletes). Out of all recreational practitioners, 56.57% practice dominantly anaerobic and 43.42% aerobic type of exercise. There were 75.83% sexually active men in the last two months. Among those with sufficient physical activity, the proportion of sexually active men is 84.37%, with insufficiently physical activity 66.79% (80.57% among recreational practitioners, 91.89% among athletes). Regarding the masturbation frequency on two months basis, the results are as follows: 32.29 among sufficiently active, 32.43 among insufficiently active (29.93 in recreational practitioners, 38.49 in athletes). Sexual intercourse frequency on two months basis for those who have been sexually active was as follows: 18.27 among sufficiently active, 17.80 among insufficiently active (16.68 in recreational practitioners, 21.88 in athletes). Data from table 1 suggest that about 65% of recreational practitioners and about 55% of athletes think that the level of sexual desire

increases during their training, while about 70% of recreational practitioners and 73% of athletes think that the level of sexual desire increases after the training.

Table 1. *The proportion of people who practice exercise, according to the subjective feeling of increasing the sexual desire level during and immediately after the sport or recreational training*

	Sexual desire during the training		Sexual desire after the training	
Intensity of increase	Recreational practitioners (% of all recreational practitioners)	Athletes (% of all athletes)	Recreational practitioners (% of all recreational practitioners)	Athletes (% of all athletes)
No increase	62 (35.42%)	33 (44.59%)	51 (29.14%)	20 (27.02%)
Slightly	55 (31.42%)	15 (20.27%)	43 (24.57%)	13 (17.56)
Moderate	37 (21.14%)	16 (21.62%)	47 (26.85%)	24 (32.43%)
Severe	17 (9.71%)	7 (9.45%)	28 (16.00%)	12 (16.21%)
Very severe	6 (3.42%)	3 (4.05%)	6 (3.42%)	5 (6.75%)

Absence of erectile dysfunction was found in 43.19% of men with insufficient level of physical activity, 54.62% in those with sufficiently level of physical activity. Table 2 shows distribution of sexually active men in the past two months, according to the prevalence of premature ejaculation.

Table 2. *Distribution of sexually active men in the past two months, according to the prevalence of premature ejaculation*

		Distribution per PA level		Distribution of sufficiently PA	
PE incidence	Total sample (% of total sample)	Insufficiently PA (% of insufficiently PA)	Sufficiently PA (% of sufficiently PA)	Recreational practitioners (% of all recreational practitioners)	Athletes (% of all athletes)
Never	88 (22.79%)	40 (23.66%)	47 (21.75%)	25 (17.73%)	15 (22.05%)
Rarely	230 (59.58%)	94 (55.62%)	136 (62.96%)	94 (66.66%)	42 (61.76%)
In about half the cases	61 (15.80%)	32 (18.93%)	29 (13.42%)	19 (13.47%)	10 (14.70%)
Often	7 (1.81%)	3 (1.77%)	4 (1.85%)	3 (2.12%)	1 (1.47%)

PE-premature ejaculation, PA-physical activity

The results indicate a significantly better erectile function and sexual satisfaction in sufficiently physically active versus insufficiently physically active men, while no significance was found in the level of sexual desire and PE (table 3).

Table 3. *Results of Mann-Whitney's U Test for assessment significant differences between the groups of insufficiently and sufficiently physically active men in sexual health variables*

Variable	Insufficient PA	Sufficient PA	Mann-Whitney U Test	
	M (SD)		p	Z
Sexual desire (N=509)	6.58 (1.90)	6.75 (1.97)	0.37	-0.89
Erectile function (N=386)	20.84 (2.97)	21.39 (2.84)	0.04*	-2.03
Premature ejaculation (N=386)	3.00 (0.70)	3.05 (0.65)	0.53	-0.61
Sexual satisfaction (N=386)	45.79 (7.00)	47.13 (6.40)	0.01*	-2.38

*M-mean, SD-standard deviation, PA-physical activity, p-significance of difference (*p<0.05), Z-Z value, N-number of participants*

The results indicate a significant positive correlation of physical activity level with sexual satisfaction and quality of erectile function (table 4).

Table 4. *Results of linear bivariate regression analysis for testing the contribution of physical activity level to sexual health variables*

Independent variable	Dependent variable	N	β	p	R^2
Physical activity level	Sexual desire	509	0.04	0.32	0.00
	Erectile function	386	0.09	0.04*	0.01
	Premature ejaculation	386	0.03	0.48	0.00
	Sexual satisfaction	386	0.09	0.04*	0.01

*N-number of participants, β– standardized regression coefficient, p-significance of correlation (*p<0.05), R^2- proportion of variance of the dependent variable explained by an independent variable*

Examining the type of exercise of recreational practitioners, the results do not suggest significant differences in the domains of sexual health between the groups of men who dominantly practice aerobic or anaerobic type of exercise (table 5).

Table 5. *Results of Mann-Whitney's U test for the difference in sexual health variables between the groups of recreational practitioners who practice dominantly aerobic and anaerobic physical exercise*

Variable	Aerobic	Anaerobic	Mann-Whitney U Test	
Sexual desire	Mean		p	Z
	6.54	6.66	0.85	-0.18
Erectile function	22.20	22.06	0.62	0.48
Sexual satisfaction	48.58	50.14	0.44	-0.75

p-significance of differences at level p<0.05, Z-Z value

An analysis of differences between recreational practitioners and athletes in sexual health variables (table 6), point to significantly higher sexual satisfaction in athletes, while significance has not been confirmed for the level of sexual desire, erectile function and PE.

Table 6. *Results of Mann-Whitney's U test for assessing the difference in in sexual health variables between recreational practitioners and athletes*

Variable	Recreational	Athletes	Mann-Whitney U Test	
	Mean		p	Z
Sexual desire	6.62	7.08	0.06	1.87
Erectile function	21.39	21.47	0.89	0.13
Premature ejaculation	3.06	3.04	0.80	0.24
Sexual satisfaction	46.37	48.91	0.01	-2.57

p-significance od differences at level p<0.05, Z-Z value

The results (table 7) point to a significant positive correlation between the number of recreational or sport training hours on weekly basis and the level of sexual desire and quality of erectile function, although for those variables a very small proportion of variance of the dependent variables was observed.

Table 7. *Results of linear bivariate regression analysis to determine the contribution of the number of sport or recreational training hours on weekly basis to sexual health variables*

	Sexual desire		
Independent variable	**β**	**p**	**R^2**
Number of training hours on weekly basis	0.29	0.00**	0.02
	Erectile function		
	β	p	R^2
	0.11	0.02*	0.01
	Sexual satisfaction		
	β	p	R^2
	0.04	0.33	0.00

*β– standardized regression coefficient, p-significance of correlation (*p<0.05, **p<0.01), R^2- proportion of variance of the dependent variable explained by an independent variable*

Examining the relationship between body image satisfaction and sexual health factors (table 8), results suggest that men who are more satisfied with their body image have a better erectile function. Small proportion of erectile function variable explained by the body image satisfaction suggest that body image satisfaction is important, but not one of the most important factors to ensure the quality of erectile function.

Table 8. *Results of linear bivariate regression analysis for testing the contribution of body image satisfaction to sexual health variables*

Variable	**Body image satisfaction [α]**		
	β	**p**	**R^2**
Sexual desire	-0.04	0.36	0.00
Erectile function	-0.16	0.00**	0.02
Sexual satisfaction	-0.00	0.96	0.00

*[α]-result 0 represents satisfaction with body image (-8 to +8 represent the level of dissatisfaction), β– standardized regression coefficient, p-significance of correlation (**p<0.01), R^2- proportion of variance of the dependent variable explained by an independent variable*

Discussion and Conclusions

The association between physical activity and various factors of sexuality has been recognized in a certain number of studies, most of which suggest a positive correlation between physical activity or exercise and the level of sexual desire, quality of sexual function and sexual satisfaction, but mostly on the older sample than was used in this study (Cheng et al., 2007; Giugliano et al., 2010; Hsiao et al., 2012; Janiszewski et al., 2009; La Vignera et al., 2011). The results of this study point to a significantly better erectile function and higher sexual satisfaction in sufficiently physically active male students compared to insufficiently active ones, while the significances were not shown for the sexual desire and PE. Some of the mechanisms of better erectile function in physically active men are often explained by psychosocial and the following reasons (and their combinations): improvement of endothelial function and nitrogen oxide flow, vascularization of penile vasculature and reduction of oxidative stress (Leoni et al., 2014; Leško et al., 2016). Observing the causes of erectile dysfunction, it was noticed that it shares risk factors with cardiovascular and metabolic diseases such as diabetes, and is often associated with lifestyle factors such as sedentary lifestyle, hormonal imbalance, but also psychologically conditioned (mental difficulties, stress, anxiety associated with sexual activity, body image dissatisfaction etc.). Apart from the mentioned positive psychological effects of physical activity, mechanisms explaining better erectile function among physically active men may be found in some of the immediate effects of physical activity, such as fat tissue reduction, improved physical condition, coronary blood flow, endothelial and cardiorespiratory function, and reduction of triglyceride and hypertension (Vina et al., 2012). There are many indirect

effects of physical activity in primary and secondary prevention of cardiovascular and metabolic diseases such as diabetes, which is one of the more frequent risk factors for erectile dysfunction. As the level of physical activity in this sample explains a very small part of the total variation of sexual health factors, it may be concluded that in this young age group with good sexual health, the level of physical activity is an important but not one of the most important factors in preserving the quality of sexual health. Taking into account the results of the majority of researches that point to a higher level of association between physical activity and sexual health in the elderly, to assume is that the level of physical activity is positively associated to the factors of sexual health in young people while the size of the correlation increases by age. Although previous studies suggest that the relationship between physical activity and sexual health increases with age, this study suggests to a better sexual health of physically active men already in the student age. Some studies point to the positive effects of aerobic physical activity on sexual health (La Vignera et al., 2011; Maio et al., 2010), but the research on the relationship between anaerobic physical activity and sexual health was not found, which does not allow comparing the results with other studies. As a result of both, aerobic or anaerobic type of exercise, the level of testosterone increases (Hackney et al., 1995). Since potential mechanisms that describe the association of physical activity and sexual health such as improving endothelial function, blood circulation in the genital region, etc. (Leoni et al., 2014; Leško et al., 2016), can be achieved independently of the type of exercise, the fact that significant differences in sexual health factors by type of physical exercise were not been found, may be considered as logical. The findings indicate that physical activity is positively related to the factors of sexual health, regardless of whether the dominant aerobic or anaerobic type of physical activity is practiced.

The potential reasons of positive correlation between the number of training hours on weekly basis and the level of sexual desire and the quality of sexual function may be explained by the fact that a higher incidence of exercise allows bigger physical changes compared to occasional, less frequent exercise. In the context of the number of training hours, Mirone et al. (2004) suggest that exercise of at least two hours per week has been associated with reducing the risk of erectile dysfunction. It was noted in this study that the critical value of the total physical activity level of 3001 or more MET-min per week differs men with better and worse sexual health. Physical activity includes the entire movement during the day (leisure activities, work activities, carrying activities, carrying out household tasks, etc.). Due to the results obtained, it may be concluded that the number of training hours as one of the constituents of total physical activity, is important in preserving the quality of men's sexual function. Due to a lack of research on correlation between the number of training hours and sexual health, it is not possible to compare the results of this research.

In this study, significantly better erectile function among men who are more satisfied with their own body image was observed. Woertman & Van den Brink (2012) suggested that the problems caused by body image dissatisfaction can cause interference from all domains of sexual function, but also difficulties related to sexual behaviour in general, avoiding sexual contact, and risky sexual behaviour. Researches that have studied the correlation between body image satisfaction and sexual health are more often conducted on a female sample. By observing the relation between body image satisfaction and quality of sexual function, their association was noted in a significant number of researches. Davison and McCabe (2005) mentioned the relationship between the body image and the quality of sexual function in middle-aged men, in whom dissatisfaction with body image was related to sexual dysfunction. The findings indicate that the men in this research achieve sexual satisfaction no matter how satisfied they are with their own body image. A potential reason may be in the more direct orientation of men to sexual performance, than on the image of their own body (Purdon & Holdaway, 2006). Men who are more satisfied with their own body image are more confident (Tiwari, 2015), which may have a beneficial effect on erectile function, which may be physiologically and psychologically conditioned. Also, in comparing to women, men rarely believe that their own body image has influenced their sexual relations (Ambwani & Strauss, 2007). Sexual satisfaction is a complex construct that, apart from sexual activity itself, also includes sexual feelings/experience, sexual intercourse, sexual focus, emotional attachment or closeness/intimacy. Potential reasons for the obtained results may be found in each of the above domains, whereby certain domains are, individually, more important than the others.

Since this is a transversal research with a correlation plan, it is not possible to make causal conclusions. Although the questionnaires are not the most reliable method for assessing physical activity level (Warren et al., 2010), this is the most frequently used method (Sallis & Saelens, 2000), and the cheapest way of collecting data for a large number of participants in a short period of time (Warren et al., 2010). This study may contribute to the dissemina-

tion of information on differences in sexual health factors between sufficiently physically active and insufficiently physically active young men. Findings may be useful to doctors, sexual therapists, sport scientists and other experts in order to expand the knowledge about physical activity as one of the primary prevention methods of sexual dysfunction. Due to a global lack of research on sexual health of the athletes, this study may serve to expand the knowledge of sexual health among that specific, physically active population. Further research on national patterns of different age groups of adult men and research on the athletes of various sports, longitudinal researches and qualitative researches, which can help to explain the relationship between physical activity and sexual health, are recommended.

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Primljen: 02. novembar 2018. / Received: November 02, 2018
Prihvaćen: 26. novembar 2018. / Accepted: November 26 , 2018