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Original Research Article

Selected Determinants of Nutritional Choices among Polish Handball Players

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Abstract

Purpose: The aim of the study was to analyse the frequency of consuming selected groups of food products among Polish handball players depending on their sports experience and level of generalised self-efficacy. Methods: The research was conducted among a group of 142 men aged 20-36, using an author-designed questionnaire regarding the frequency of consuming selected food groups and the Generalised Sense of Self-Efficacy Scale (GSES). Statistical analysis of the results was carried by estimating Spearman's signed rank correlation coefficients. Results: The examined handball players usually included the following in their diet: vegetables and fruits, and several times a week: refined and whole grain cereal products, milk and dairy products, eggs, poultry and pork meat, processed meats, sweets and confectionery products. Typically, once a week, they ate: sea fish, vegetable oils, nuts, fast food products, and sweetened carbonated beverages. It was shown that along with the experience in competition, the consumption of fruit and vegetables (p=0.045) and vegetable oils (p<0.001) increased, while consuming eggs (p<0.001) and fast food products became less frequent (p=0.001). A positive correlation was also found between the level of self-efficacy and the frequency of consuming vegetables (p<0.001) as well as milk and dairy products (p=0.004), and a negative correlation with the frequency of consuming eggs (p=0.049) and alcoholic beverages (p=0.007). Conclusions: In the studied group of Polish handball players, nutritional errors related to the low frequency of consuming whole grain cereals, dairy products and nuts, as well as a tendency towards more rational nutritional choices along with longer professional experience and a more intense sense of self-efficacy, were demonstrated.

Keywords: nutrition, frequency of food consumption, athletes, handball players, professional experience, sense of generalised self-efficacy.

INTRODUCTION

One of the important factors in improving health and exercise capacity is the implementation of a balanced and varied diet, with a high proportion of products having high nutritional density (vegetables, fruits, whole grain cereals, legumes, reduced fat dairy products, fish and nuts). The current dietary models and recommendations of scientific centres also indicate the limitation of products with low nutritional and high energy density (confectionery and fast food products, sweetened beverages, etc.). Recommendations for athletes also point to the importance of water and other unsweetened beverages in regulating water and electrolyte balance (Burke, 2008; Kerksick, *et al*., 2017; Oliveira, *et al*., 2017; Thomas, Erdmann & Burke, 2016).

A group with increased and specific nutritional needs are professional handball players, whose training effectiveness depends on the level of various motor characteristics, including speed, agility, strength and physical endurance (Michalsik & Aagaard, 2015; Saavedra, Halldórsson, Kristjánsdóttir, Þorgeirsson & Sveinsson, 2019; Sabido, Hernández-Davó, Botella, Jiménez-Leiva & Fernández-Fernández, 2018). In handball, interval efforts and body contact occur (Michalsik, Madsen & Aagaard, 2015), which require players to, e.g. acquire high muscle strength (Ferragut, Vila, Abraldes & Manchado, 2018).

Vigorous exercise during handball games necessitates meeting increased nutritional demands (Heaton, *et al*., 2017; Lopez-Samanes, *et al*., 2015). A rational diet (possibly enriched with supplementation) increases exercise capacity, and thus, the effectiveness of training and rate of post-exercise regeneration, while reducing the risk of injury (Muñoz, *et al*., 2020). Meanwhile, in a new systematic literature review, it was found that team sports athletes do not meet nutritional recommendations, especially in terms of energy and

carbohydrate supply (Jenner, Buckley, Belski, Devlin & Forsyth, 2019).

Pro-health behaviours, including those nutritional, are determined by a wide range of environmental and personality factors (Remick, Polivy & Pliner, 2009). Among the psychological features essential for shaping health culture, personal resources, including generalised sense of self-efficacy, occupy an important position. Self-efficacy is expressed by the belief in the ability to achieve intended goals, including health objectives, which are rational eating behaviours (Juczyński, 2012). The construct of self-efficacy, developed as part of Bandura's social learning theory, expresses the belief in the ability to achieve intended goals, including those related to health and sports, which are rational eating behaviours (Bandura, 1997; Juczyński, 2012). In earlier studies it has been shown that the sense of generalised self-efficacy is one of the most important psychological constructs influencing sport performance, also in team disciplines (Bandura 1997; Feltz & Lirgg, 2001; Feltz, Short & Sullivan, 2008). It is worth adding that the achieved successes, along with those concerning sports, significantly strengthen generalised sense of self-effectiveness (Bandura, 1997).

Among research on the diet of athletes training team sports, there are many reports on the nutritional behaviour of football players (Gacek, 2018; García-Rovés, García-Zapico, Patterson & Iglesias Gutiérrez, 2014; Ono, Kennedy, Reeves & Cronin, 2012; Petri, Mascherini, Pengue & Galanti, 2016). However, there are few publications regarding dietary choices of handball players, despite the significance of diet quality for their health and exercise capacity. The available studies concern nutrition of handball players competing at the Superleague level (Dymkowska-Malesa, Swora-Cynar, Grzymisławska & Grzymisławski, 2016), the influence of nutritional education on the nutritional status indices and eating habits of handball players (Molina-López, et al., 2013), the use of sports supplements in professional handball depending on gender and the level of competition (Muñoz, et al., 2020), assessment of energy and nutrient supply in the diet of Slovenian semi-professional handball players (Teraž & Meulenberg, 2020), the relationships between diet and physical activity performance of juniors training handball (Martin & Tarcea, 2015) and determinants of the level of nutritional knowledge among Turkish handball players (Gümüşdağ & Kartal, 2017).

Due to the fact that in u studies relationships have been demonstrated between age, experience and sports level as well as personal resources and nutritional behaviour of athletes training competitive team sports (Gacek, 2015; Gacek, 2018; Gacek, 2019), research was undertaken on selected individual determinants of dietary choices among handball players, who are a group under-exploited in this field of research.

The aim of the study was to analyse the frequency of consuming selected groups of food products among Polish handball players depending on their sports experience and level of generalised self-efficacy in relation to nutritional recommendations for athletes.

METHODS

Participants

The study was carried out in 2016-2020 among a group of 142 men aged 20-36 (22.9±4.2). The basic criterion for the open selection of participants was playing sports professionally for at least 3 years. The participants' professional sports experience was between 3 and 23 years (9.6±4.4).

Instruments

In the study, an author-designed original questionnaire regarding the frequency of consuming selected groups of food products was used. The frequency of consuming 18 groups of food products with varied nutritional and health values were assessed via an ordinal scale, assigning a specific number of points to each frequency category: daily (5), several times a week (4), once a week (3), once a month (2), less frequently/never (1). The applied original nutrition assessment questionnaire was subjected to a validation procedure, which showed high repeatability of the results. The results of the test and re-test did not demonstrate any statistically significant differences (Chi^2 McNemar $p>0.05$ and Phi $p>0.05$).

Sense of self-efficacy was measured using the standardised Generalised Sense of Self-Efficacy Scale (GSES) by R. Schwarzer, M. Jerusalem and Z. Juczyński (Juczyński, 2012). The GSES scale, containing 10 items, is constructed in such a way that the higher the test result (within the range of 10-40 points), the higher the sense of generalised self-efficacy. The median of raw GSES scores in the studied men was 32 (M±SD=31.92±4.60, Q25=29, Q75=35). The analysis showed a significant relationship between sports training experience and the sense of efficacy among the tested handball players (R=0.373, $p<0.001$).

The research was conducted in accordance with the principles of the Declaration of Helsinki after obtaining the participants' informed consent.

STATISTICAL ANALYSES

Statistical analysis of the results was carried out using the PQStat ver. 1.8.0.444. The relationships between experience and the level of generalised self-efficacy as well as the frequency of consuming particular groups of products were analysed by calculating Spearman's signed rank correlation

coefficients. The test probability set at the level of $p<0.05$ was considered significant, while $p<0.01$ was interpreted as highly significant.

RESULTS

Based on the median values, it was found that handball players most often, i.e. every day (Me=5), included vegetables, fruit and mineral water and other unsweetened beverages in their diets. Frequently, several times a week (Me=4), they consumed: refined and wholegrain cereal products, milk and dairy products, eggs, poultry and pork, processed meats and sweets and confectionery products. Usually, once a week (Me=3), they consumed: sea fish, vegetable oils, nuts, fast food products and sweetened carbonated and non-carbonated beverages. Energy and alcoholic drinks were chosen less frequently, i.e. once a month (Me=2) (Tab. 1).

Table-1: Frequency of consuming food product groups among athletes training handball (descriptive statistics)

Food products	M	Me	SD	Min	Max	Q25	Q75
Vegetables	4.51	5.00	0.56	3.00	5.00	4.00	5.00
Fruits	4.46	5.00	0.71	3.00	5.00	4.00	5.00
Wholemeal cereal products	4.25	4.00	0.64	3.00	5.00	4.00	5.00
Refined cereal products	4.29	4.00	0.84	1.00	5.00	4.00	5.00
Milk and dairy products	4.02	4.00	0.89	1.00	5.00	4.00	5.00
Eggs	3.86	4.00	0.74	1.00	5.00	4.00	4.00
Sea fish	2.70	3.00	0.75	1.00	4.00	2.00	3.00
Pork meat	4.03	4.00	0.80	1.00	5.00	4.00	4.00
Poultry meat	4.17	4.00	0.72	1.00	5.00	4.00	5.00
Processed meats	4.02	4.00	0.71	1.0	5.0	4.0	5.0
Vegetable oils	3.01	3.00	1.18	1.00	5.00	2.00	4.00
Nuts	2.75	3.00	1.22	1.00	5.00	2.00	4.00
Fast food	2.58	3.00	0.89	1.00	4.00	2.00	3.00
Sweets, confectionary products	3.32	4.00	1.11	1.00	5.00	3.00	4.00
Sweetened carbonated or non-carbonated beverages	2.70	3.00	1.17	1.00	5.00	2.00	4.00
Energy drinks	2.18	2.00	1.04	1.00	4.00	1.00	3.00
Mineral water and other unsweetened beverages	4.91	5.00	0.36	3.00	5.00	5.00	5.00
Alcoholic beverages	2.39	2.00	1.01	1.00	5.00	2.00	3.00

M- arithmetic mean, Me- median, SD- standard deviation, Q25- lower quartile, Q75- upper quartile
Scale of consumption frequency: daily (5), several times a week (4), once a week (3), once a month (2), less frequently/never (1)

Statistical analysis allowed showing significant correlations between sports training experience and the frequency of consuming certain groups of food products by handball players. It has been shown that along with experience in competition, the consumption of fruit and vegetables ($p=0.045$) as well as vegetable oils ($p<0.001$) increased, while the consumption of eggs ($p<0.001$) and fast food products ($p=0.001$) decreased (Tab. 2).

There was also a positive correlation between the level of self-efficacy and the frequency of consuming vegetables ($p<0.001$) and milk as well as dairy products ($p=0.004$), and a negative correlation with the frequency of consuming eggs ($p=0,049$) and alcoholic beverages ($p=0.007$) (Tab. 2).

Table-2: Spearman's signed rank correlation coefficient between sports training experienced and the level of generalised sense of self-efficacy (GSES) and the frequency of consuming selected food groups among handball players

Food products	Sports training experience		GSES	
	R	*p*	R	*p*
Vegetables	0.168	0.045	0.409	<0.001
Fruits	0.169	0.045	0.096	0.253
Wholemeal cereal products	0.136	0.106	-0.106	0.207
Refined cereal products	0.135	0.108	-0.021	0.799
Milk and dairy products	-0.160	0.057	0.238	0.004
Eggs	-0.339	<0.001	-0.166	0.049
Sea fish	-0.018	0.835	0.035	0.683
Pork meat	0.019	0.816	0.058	0.494
Poultry meat	-0.039	0.644	0.046	0.583

Food products	Sports training experience		GSES	
	R	*p*	R	*p*
Processed meats	0.018	0.811	0.055	0.491
Vegetable oils	0.296	<0.001	-0.039	0.645
Nuts	0.109	0.197	0.112	0.189
Fast food	-0.268	0.001	-0.140	0.095
Sweets, confectionary products	0.031	0.711	-0.044	0.601
Sweetened carbonated or non-carbonated beverages	0.134	0.110	-0.133	0.115
Energy drinks	-0.041	0.627	-0.066	0.434
Mineral water and other unsweetened beverages	0.058	0.496	-0.098	0.245
Alcoholic beverages	-0.105	0.213	-0.224	0.007

DISCUSSION

The discussed research allowed showing incorrect nutritional behaviours and relationships between the frequency of consuming certain food groups according to professional experience and sense of generalised self-effectiveness among handball players. The revealed mistakes concerned, in particular, the low frequency of consuming recommended food products with high nutritional density (whole grain products, dairy products and nuts). It should also be pointed out that there is a negative tendency regarding a comparable frequency of consuming contraindicated sweets and confectionery products and those recommended in the diet concerning wholemeal and dairy products. Furthermore, the frequency of consuming non-recommended fast food products and sweetened beverages is comparable to sea fish and nut consumption recommended in the diet. The occasional consumption of energy and alcoholic drinks may be assessed positively.

Assessment regarding the frequency of consuming product groups in terms of their nutritional value may indicate positive trends in hydration (water and other non-sweetened beverages are recommended) and the supply of antioxidants, potassium and magnesium (daily consumption of vegetables and fruits). This is positive with regard to antioxidant status, the regulation of which is connected with a diet rich in vegetables and fruits (Frączek, Morawska, Gacek & Pigoń, 2019). Too low frequency of consuming wholemeal and dairy products (several times a week) may limit the supply of dietary fibre and calcium. The risk of low intake of probiotic products (e.g. fermented milk) in the diet should also be pointed out as it creates a risk of developing dysbiosis in athletes (Cronin, *et al*., 2017). In turn, excessively low consumption of sea fish, oils and nuts (once a week) may reduce the supply of unsaturated acids, including omega 3, which positively regulate the blood lipid profile (Gillingham, Harris-Janz & Jones, 2011). At the same time, frequent (several times a week) consumption of sweets and confectionery products increases the risk of an excessive supply of simple sugars and Trans isomers. The observed tendency towards rare consumption of alcoholic beverages by handball players should also be mentioned, which is positive due to the negative impact of alcohol on restoring post-exercise homeostasis, including water and electrolyte balance among athletes (Vella & Cameron-Smith, 2010).

Improper nutritional decisions found in the studied group of handball players correspond with the trends described by other authors. Similar nutritional mistakes related to the insufficient consumption of certain groups of food products with high nutritional density, including whole grain cereal and dairy products, as well as fish, have also been described among athletes training team sports (Abbey, Wright & Kirkpatrick, 2017; Gacek, 2015; Jenner, *et al*., 2018; Petri, *et al*., 2016). The obtained results can also be related to the research among handball players. In a study on professional Spanish handball players (N=14), excessively low energy levels were also found, as well as low energy from carbohydrates but high from fats (Molina-López, *et al*., 2013). In another study on 2 Slovenian semi-professional handball teams (17 men and 9 women) from the 1st league, insufficient energy and carbohydrate intake as well as excessive fat intake were also found (Teraž & Meulenberg, 2020). Similarly, in a study among handball players at the Superleague level, positive eating behaviours were noted in terms of the number and frequency of consuming meals, however, their diet was not balanced, as deficits in energy, protein, calcium, iron and potassium were found, as well as an excess of fat, phosphorus and sodium intake (Dymkowska -Malesa, *et al*., 2016). In another trial regarding the relationship between diet and training effectiveness of junior handball players (N=57) from Târgu Mures, a relationship was confirmed between food consumption and exercise effectiveness. It has been noted that for young athletes, diet quality is crucial for achieving a high level of training (Martin & Tarcea, 2015). Thus, the results of the author's study and research carried out by other authors allow to indicate qualitative and quantitative improper nutritional behaviours among athletes training handball, regardless of gender and sports level.

In the discussed research, a relationship between professional experience and the frequency of consuming selected product groups was also shown, with an indication of a tendency towards more rational

choices along with the duration of sports experience. These trends particularly concerned the more frequent consumption of recommended products (including fruit, vegetables and vegetable oils), and less frequently consuming fast food products not recommended in the diet, but also eggs (recommended sources of protein). The indicated trends may, therefore, allow suggesting greater nutritional awareness and greater attention paid to quality of the diet by players with longer professional experience (correlated with sports level). Tendencies towards more rational eating behaviours with age (experience and sport level) have also been described among athletes training team sports (Gacek, 2018). Also among Polish regional football referees, it was shown that along with experience in refereeing, the frequency of consuming products recommended in the diet (fruit, milk and dairy products with reduced fat content and nuts), as well as alcoholic beverages, increased. On the other hand, the consumption of sweetened carbonated drinks and refined cereal products, as well as sea fish, decreased. Thus, the observed trends were not fully unambiguous (Gacek, Kosiba & Wojtowicz, 2020).

In this study, a relationship was also demonstrated between sense of self-efficacy and frequency of consuming certain groups of products, indicating a tendency towards more rational choices among players with a higher level of self-efficacy. These trends especially concerned more frequently consuming recommended products, including vegetables, milk and dairy products, while less frequently consuming alcoholic beverages, but also eggs. The demonstrated relationships indicate an existing correlation between high level of self-efficacy and more correct nutritional choices among handball players, which can be explained by their belief in the possibility of achieving specific goals, including those related to health and sport, in which a rational model of nutrition plays a significant role.

Similar tendencies towards more rational food choices among individuals with higher levels of self-efficacy were obtained in other groups of athletes, including Polish American football players (Gacek, 2015). Among athletes performing team sports disciplines (N=517), it was shown that players with a high level of optimism (correlated with self-efficacy), significantly more often consumed the recommended products, including vegetables, fruit and vegetable fats than players with a low level of this trait (Gacek, 2019). Furthermore, in research among Polish basketball players, it was indicated with regard to a relationship between a higher level of self-efficacy and rational eating behaviour in terms of regularity of eating meals, preferring unsweetened beverages, daily consumption of fruit and vegetables, and avoiding fast food and confectionery products (Gacek & Wojtowicz, 2021). Overall, the meta-analysis allowed to confirm the predictive significance of high self-efficacy in promoting health-related behaviours, including nutritional ones (Sheeran, *et al*., 2016).

The described incorrect nutritional behaviours noted among the examined handball players, which could reduce the nutritional value of their diets, confirmed the validity of monitoring and rationalising the diets of athletes, as a rational diet is one of the factors contributing to achieving professional success. Other authors also drew attention to the need for nutritional education in handball players (Gümüşdağ & Kartal, 2017; Molina-López, *et al*., 2013).

The significance of the presented work is related to addressing the underexploited research issues regarding selected determinants of food choices among handball players. The author is aware of the limitations of work (questionnaire research, limitations of author-designed questionnaire on nutrition, small number of analysed factors), hence, referring to them, it should be noted that in subsequent research, a greater number of analysed variables (sports level, wider nutritional analysis, a wider spectrum of psychological and environmental factors) should be taken into account.

CONCLUSIONS

1. In the studied group of handball players, incorrect qualitative nutritional behaviours were demonstrated with regard to the low frequency of consuming some recommended food products, especially whole grain and dairy products, as well as nuts.
2. In the studied group of handball players, the relationships between professional experience and sense of generalised self-efficacy and the frequency of consuming certain product groups were shown, indicating tendency towards more rational choices along with the experience and sense of self-efficacy, while not all relationships were fully unambiguous. It was shown that athletes with longer experience in sports more often consumed fruit and vegetables and vegetable oils, and less frequently fast food and eggs. In turn, competitors with a higher sense of self-efficacy more often included vegetables, milk and dairy products in their diets, less frequently consuming alcoholic beverages and eggs.
3. The results allow suggesting the validity of monitoring and rationalisation of handball players' diets, which could promote health and physical efficiency of these players.

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