Body composition and lipid profiles, quality of life, self-concept, and nutritional knowledge of Pahlavani wrestlers in Kermanshah

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Article Info	Abstract
	Background: Pahlavani wrestling is one of the ancient sports in Iran. However, very few studies have been conducted on various aspects of it. **Aim:** To investigate the body composition, lipid profile, quality of life, self-concept, and nutritional knowledge of Pahlavani wrestlers of Kermanshah city. **Materials and Methods:** Fifty-seven adult Pahlavani wrestlers participated in this study. They completed the quality of life, self-concept, and nutritional knowledge questionnaires on three consecutive days, and then, on two separate days, their body composition and lipid profile were also measured. **Results:** The quality of life, muscle mass percentage, and bone and mineral content were significantly higher than the normal values ($P<0.05$). Also, the lipid profile was in a normal state. Conversely, the self-concept, nutritional knowledge, nutritional attitude, and nutritional practice were significantly lower than the normal values of these variables ($P<0.05$). Finally, the BMI was significantly lower than the normal value ($P<0.05$) and the fat percentage and visceral fat index were not significantly different ($P>0.05$) from their normal values. **Conclusion:** The results indicated that Pahlavani wrestlers of Kermanshah are in favorable conditions in many physical and body composition health indicators, which somehow shows the possible positive effects of this sport on different aspects of health. However, Pahlavani wrestlers had a considerably lower self-concept and nutritional knowledge than the normal values.

1. Introduction

Pahlavani wrestling is well-known as one of the ancient sports in Iran and accordingly, many athletes in different cities in Iran are participating in this sport [1]. Despite this interest, in the past years, a professional view has not prevailed in this sports field, either at the level of management or at the level of training programs and also continuous monitoring. Recently, with the revision of the rules, changes in the holding style of the competitions, and a more professional overview of the training, a new approach has been adopted in this sport, and this new approach is accompanied by the need to conduct scientific studies regarding various aspects of this sport. The formation of the scientific research committee in the *"Zurkhaneh Sports and Koshti Pahlavani Federation"* in 2018 is proof of a positive approach to this ancient sport.

In this regard, one of the first and most important steps can be to investigate the current status of active athletes in this sport in terms of physical, psychological, and nutritional composition. A lot of evidence has shown that maintaining the body composition in the normal range increases life expectancy and reduces the risk of heart disease, cancer, diabetes, and many other chronic diseases [2].

On the other hand, the results of many studies have shown that anthropometric characteristics hold the ability to predict the success of athletes to reach high levels of athletic performance [3, 4, 5].

Another important factor that is widely measured to assess the health and professional condition of athletes is their lipid profile, which indicates triglycerides, total cholesterol, high-density lipoprotein (HDL), and low-density lipoprotein (LDL). It has been proposed that monitoring the lipid profile of athletes could be a clinical tool to identify so-called *"High-Risk Athletes"* and prevent the development of cardiovascular diseases, atherosclerosis, and dyslipidemia in these athletes in the future [6].

Recent evidence has also highlighted the importance of athletes' nutritional knowledge and attitude in their health, fitness, and sports performance [7, 8, 9]. Interestingly, the results of a recent systematic review have revealed that athletes have a low nutritional knowledge, which accentuates the need for evaluating this factor in different sports and taking appropriate actions if necessary [10].

In addition, the psychological and perceptual dimensions of athletes' personalities in interaction with the physiological and physical dimensions play a very important role both in their daily lives and in their optimal sports performance [11, 12]. Factors such as quality of life and physical self-concept are among the most important factors that are both affected by sports and physical activity and can influence the optimal performance of athletes [12, 13]. For instance, it has been shown that positive self-concept enhances performance in everyday life as well as in sports activities [14]. In addition, the most recent findings have highlighted the importance of creating "psychological profiles" for athletes that can forecast their performance while safeguarding their overall well-being [15]. Therefore, measuring these factors can lead to more knowledge about the characteristics of athletes and provide the basis for better planning in order to improve the status of athletes.

Taking the abovementioned discussion into account, considering the quantitative and qualitative development of Pahlavani wrestling in recent years, which has

profoundly transformed this sport, and also the dearth of information on the status of the Pahlavani wrestlers, in this study, as one of the first demand-driven scientific studies conducted in this field, we investigated the body composition and lipid profiles, quality of life (QOL), self-concept (SC), nutritional knowledge (NK), nutritional attitude (NA), and nutritional practice (NP) of Pahlavani wrestlers in the city of Kermanshah as one of the famous cities in terms of Pahlavani wrestling in Iran. We hypothesized that Pahlavani wrestlers have a normal condition concerning the variables measured in this study.

2. Materials and Methods

2. 1. Research design
This study was a cross-sectional descriptive-comparative study aiming at describing body composition and lipid profiles, QOL, SC, NK, NA, and NP of the Pahlavani wrestlers of Kermanshah and also comparing them with normal values of the variables.

2. 2. Participation
Following the official approval of the research project, necessary correspondence was conducted with the Pahlavani Wrestling Board of Kermanshah, and all information on the active Pahlavani wrestlers of Kermanshah was collected. According to the provided information, there were 80 active adults Pahlavani wrestlers in Kermanshah at the time. Considering the population size and using the below sample size estimation formula, commonly applied for estimating the sample size in descriptive studies with a specific population [16]:

$$N = \frac{\frac{p(1-p) \times Z^2}{e^2}}{1 + \frac{p(1-p) \times Z^2}{ne^2}}$$

N= Sample Size
n= Population size
p= Population Proportion
e= Margin of error (percentage in decimal form)

A sample of 38 participants (representing 47.5% of the target population) was deemed appropriate for this study. However, in order to obtain more accurate results, a total of 57 male Pahlavani wrestlers (age= 23.96±6.45) voluntarily participated in this study. The participants were professional Pahlavani wrestlers at the national level with the mean experience of three years of practicing this sport and taking part in regional and national competitions. According to the size of the target population (80 individuals), simple random sampling was used for the participants' recruitment in this study. To do so, first each individual was given an identifier code and then, using www.random.org website, 57 participants were chosen randomly to take part in the current study.

2. 3. Instrument
To assess participants' QOL, the standardized 36-item Short Form Health Survey (SF-36) from the World Health Organization was used. This questionnaire comprises eight subscales, and the final score of these eight subscales show the quality of life in two dimensions: physical health and mental health. The score range of this questionnaire is between 0 and 100, with higher values indicating a higher quality of life [17]. The validity and reliability of the Persian version of the SF-36 have already been proven [18]. The

participants' SC was assessed using the Beck Self-Concept Questionnaire. This questionnaire comprises 25 items, addressing aspects like appearance, intelligence, kindness, success, and other psychological factors. Each item involves a response on a 5-point Likert scale. Consequently, the self-perception questionnaire yields a score ranging from 25 to 125, where higher scores signify elevated self-perception [19].

The validity and reliability of the Persian version of the Beck Self-Concept Questionnaire have already been proven [20]. To evaluate the NK, the Standardized Modified Nutritional Knowledge Questionnaire by Parmenter and Wardle was used. The questionnaire comprises four sections, with the first covering the personal and anthropometric information of the participants. The second section contains 44 questions assessing participants' knowledge of food groups and their constituents. The third section includes 35 questions about athletes' attitudes toward nutritional issues and related diseases, and the fourth section consists of eight questions addressing nutritional practice [21]. The validity and reliability of the Persian version of the questionnaire have already been proven [22].

For lipid profile measurement, 5.4 milliliters of fasting blood from the brachial vein were taken by a laboratory specialist and sent to the laboratory for measuring serum levels of LDL, HDL, total cholesterol (TC), and triglycerides (TG). The body composition of the participants, including weight, body mass index (BMI), body fat percentage (BF), visceral fat index (VFI), percentage of muscle mass (SM), bone and mineral content (BMC), was measured by body analyzer machine (InBody 230, South Korea) and quantum

analyzer machine and portable quantum analyzer machine (Amazheal, Japan). Measuring body composition by quantum analyzer machine is a new non-invasive and painless method, and reportedly has an accuracy of 85-95% [23].

2. 4. Procedure
The participants then read and signed the informed consent form for taking part in the study. Subsequently, in a familiarization session, they were acquainted with the whole experimental procedure including the study variables and their measurement process. Detailed instructions were also provided on the questionnaires and scales used in this study and how to appropriately complete them. After the familiarization session, within three consecutive days, the participants completed the QOL questionnaire (day 1), SC questionnaire (day 2), and NK questionnaire (day 3). Then, on two separate days, the participants came to the Clinical Health Center and the Pathological Laboratory to measure body composition and lipid profile, respectively.

2. 5. Statistic
Data are presented as the mean±standard deviation (M±SD). The normal distribution of each data set was evaluated by the Shapiro-Wilk normality test. The one-sample t-test was used to compare the mean values of the study variables with the normal values of the respective variables. For QOL, SC, NK, NA, NP, MMP, and BMC having no difference or higher values compared to the normal value was considered a better condition. Regarding the TC, TG, LDL, BMI, BFP, and VFI having no difference or lower values compared to the normal value were considered a better condition. Cohen's d calculation of the effect size was also used for the comparison between each variable

and its normal value and interpreted as small (0.20–0.49), medium (0.50–0.79), or large (≥ 0.80). The statistical analyses were performed using SPSS 23 (SPSS Inc., Chicago, IL, USA) and *P*<0.05 was adopted.

3. Results

The mean values of the study variables and the normal value of each variable are presented in Table 1. The results of the one-sample t-test for comparing the mean value of each variable with the standard value of that variable are presented in Table 2.

Table 1. Mean and standard values of the study variables

Variable	Mean ± (SD)	Normal value
QOL (scores)	79.7±14.8	75
SC (scores)	89.56±8.96	93.75
NK (scores)	12.63±3.1	44
NA (scores)	11.84±4.5	35
NP (scores)	2.21±1.24	8
TC (mg/dL)	137.5±36.86	170
TG (mg/dL)	128.68±78.41	130
LDL (mg/dL)	80.1±26.36	100
HDL (mg/dL)	34.57±7.4	45
BMI (kg/m^2)	23.64±4.02	24.9
BFP (%)	19.43±6.79	19
VFI	8.92±5.05	9
MMP (%)	34.01±4.12	35
BMC (kg)	3.29±0.61	2.2

QOL: Quality of Life; SC: Self-Concept; NK: Nutrinional Knowledge; NA: Nutritional Attitude; NP: Nutritional Practice; TC: Total Cholestrol; TG: Triglycerides; BFP: Body Fat Percentage; VFI: Visceral Fat Index; MMP: Muscle Mass Percentage; BMC: Bone and Mineral Content

Table 2. Results of the one-sample t-test

Variable	Normal value	t	df	p	ES (Cohens' d)
QOL (scores)	75	2.39	56	0.02	0.31
SC (scores)	93.75	-3.52	56	0.001	0.46
NK (scores)	44	-74.8	56	0.0001	10
NA (scores)	35	-38.65	56	0.0001	5.1
NP (scores)	8	-34.9	56	0.0001	4.75
TC (mg/dL)	170	-6.65	56	0.0001	0.88
TG (mg/dL)	130	-0.127	56	0.9	0.01
LDL (mg/dL)	100	-5.69	56	0.0001	0.75
HDL (mg/dL)	45	-10.61	56	0.0001	1.4
BMI (kg/m^2)	24.9	-2.34	56	0.022	0.31
BFP (%)	19	0.48	56	0.63	0.19
VFI	9	-0.105	56	0.91	0.014
MMP (%)	35	-1.8	56	0.077	0.23
BMC (kg)	2.2	13.52	56	0.0001	1.7

QOL: Quality of Life; SC: Self-Concept; NK: Nutrinional Knowledge; NA: Nutritional Attitude; NP: Nutritional Practice; TC: Total Cholestrol; TG: Triglycerides; BFP: Body Fat Percentage; VFI: Visceral Fat Index; MMP: Muscle Mass Percentage; BMC: Bone and Mineral Content

3.1. QOL, SC, and NK
The results showed that the QOL was significantly higher than the normal value for this variable ($P= 0.02$). Conversely, the SC ($P= 0.001$), NK ($P= 0.0001$), NA ($P= 0.0001$), and NP ($P= 0.0001$) were significantly lower than the normal values of these variables in Pahlavani wrestlers of Kermanshah.

3.2. Lipid profile
The results also demonstrated that the LDL and TC were significantly lower than the normal values of these two variables ($P= 0.0001$, $P= 0.0001$, respectively) while there was no significant difference between the TG and its normal value ($P= 0.9$) and also the HDL was significantly lower than the normal value ($P= 0.0001$) in Pahlavani wrestlers of Kermanshah.

3.3. Body composition
Moreover, the results of the present study revealed that there were no significant differences between the BFP ($P= 0.63$), VFI ($P= 0.91$), and MMP ($P= 0.077$) and their normal values in Pahlavani wrestlers of Kermanshah. Finally, the BMI was significantly lower than the normal value and the BMC was significantly higher than the normal value in Pahlavani wrestlers of Kermanshah.

4. Discussion
In this study, for the first time to the best of our knowledge, the QOL, SC, NK, and body composition and lipid profiles of 57 active adult Pahlavani wrestlers of Kermanshah were investigated and compared with the normal values of these variables. The main findings of the present study were that the QOL, TC, LDL, TG, BMI, BFP, VFI, MMP, and BMC of the Pahlavani wrestlers of Kermanshah were

either in the normal range or even better than the normal values of these variables. On the other hand, they showed lower DC, NK, NA, NP, and HDL than the normal values for these variables.

Our results indicated that the Pahlavani wrestlers of Kermanshah showed a higher QOL than the normal value for this variable. This is in line with most of the findings in athletes. For instance, Houston et al. (2016), in their systematic review with meta-analysis reported that athletes showed a better QOL than non-athlete individuals [24]. It has been shown that participating in regular exercise training can enhance physical, psychological, and mental factors and consequently improve all aspects of the QOL [25]. Interestingly, it has been reported that the type of sport practiced has no considerable effect on the QOL [26]; So, it seems that the nature of the Pahlavani wrestling that comprises a combination of different types of activities such as aerobic, anaerobic, resistance, and high-intensity training holds the potential to boost the QOL among the active athletes in this field.

Surprisingly, our results revealed that the SC of the participants was lower than the normal value for this variable, which is in contrast with most of the studies in this context. The SC refers to a broad range of individual characteristics and includes several dimensions such as the emotional, social, academic, physical, and family status of that individual [12]. So, it is probable that other factors, more than just participating in a specific sports practice, would have affected the SC of the Pahlavani wrestlers of Kermanshah. Experiencing inequality between Pahlavani wrestling and other sports, socio-cultural deprivation, and the high unemployment rate in Kermanshah based on official reports are among the possible factors affecting the SC of the

Pahlavani wrestlers in Kermanshah. However, more research focusing on the SC and its determinants is needed to shed light on this aspect of the life of Pahlavani wrestlers in Kermanshah.

Another interesting but not surprising result of the present study was that the NK, NA, and NP of the Pahlavani wrestlers in Kermanshah were dramatically lower than the normal values for these variables. The lack of nutritional knowledge among athletes has been reported in other studies as well [9, 27]. This result must be considered a *warning sign* for athletes, coaches, and officials involved in Pahlavani wrestling because having appropriate nutritional knowledge is vital for general health and also athletic performance in the long run [28]. In this regard, conducting more research assessing the self-concept determinants are warranted. Also, our results accentuate the importance of applying appropriate interventions to improve NK, NA, and NP of Pahlavani wrestlers of Kermanshah.

Regarding the body composition and lipid profile of the Pahlavani wrestlers in Kermanshah, our results demonstrated that they are in good condition in almost all the variables measured in this study. They had appropriate levels of the LDL and TC, quite close levels of TG to the reference point, and lower than normal levels of the HDL. Accordingly, despite the fact that their general lipid profile looks normal, considering the age of the participants and their level of HDL and TG, the future perspective of their lipid profile must be taken into account to prevent any negative development in this regard. As discussed earlier, the term *"high-risk athletes"* has recently been coined to show the significance of the lipid profile and its continuous monitoring in athletes [6]. This

could prevent the development of many chronic conditions like cardiovascular diseases, atherosclerosis, and dyslipidemia, which might affect general health and also athletic performance [29]. Moreover, it has been shown that there might be a relationship between nutritional knowledge and dietary habits with lipid profile [30], which has a practical implication in our study since the Pahlavani wrestlers of Kermanshah showed very poor nutritional knowledge in all aspects. Hence, it should also be considered for future studies and also development of effective strategies in this population.

Finally, our results indicated that the body composition of the Pahlavani wrestlers of Kermanshah is in normal or even better condition. This finding is in line with the results of many other studies conducted in different sports [31, 32].

As a novel approach in the present study, in addition to the BMI and BFP which are the most common measures of body composition in most of the studies, we also measured the VFI, MMP, and BMC in the present study. These measures are important since they are associated with long-term health and consequently might have a considerable effect on athletes during their life span [33]. The VFI for example, has been shown to be one of the key indicators of several chronic metabolic diseases such as insulin resistance and hypertension [34]. The MMP is also an important factor in athletic performance and it has been shown that having more muscle mass can positively affect all dimensions of athletes' performance [35].

Likewise, the BMC has been reported to be important for the general health and also professional careers of athletes, particularly in the long term [36]. Let's bear in mind that humans lose about 1% of their

bone mass per year after the age of 25 [37]. It has practical implications for athletes because in many sports athletes are participating in different competitions until the age of 40. Based on the results of the present study, it seems that the nature of Pahlavani wrestling in terms of the amount and type of training practiced has the capability of maintaining the body composition in the most appropriate condition.

Our results concerning the BMI, BFP, VFI, MMP, and BMC in Pahlavani wrestlers of Kermanshah provide strong support for this claim and be used for introducing this sport as one of the beneficial sports for general health and all facets of body composition.

Finally, despite taking all necessary details into account to provide optimum control over the study procedure, caution must be taken when considering the findings of the present study because they are not free from the effects of various limiting factors. This study was a cross-sectional study and therefore, the results might have been affected by some acute factors. Other limitation could be related to the instruments used for measuring the study variables. More research is needed to prove the findings of the present study.

5. Conclusion

In conclusion, according to the results of the present study which is considered the first study conducted on Pahlavani wrestlers, their body composition is in the normal range and shows the positive effect of Pahlavani wrestling on this vital aspect of general health and also athletic performance. Also, despite having an almost normal lipid profile, some caution regarding their future condition must be exercised. Finally, the SC, NK, NA, and NP

of Pahlavani wrestlers of Kermanshah are markedly lower than the normal condition which could be seen as a *"warning sign"* in this context which requires utmost attention. In this regard, conducting more research assessing the self-concept determinants are warranted.

Also, our results accentuate the importance of applying appropriate interventions to improve NK, NA, and NP of Pahlavani wrestlers of Kermanshah. Conducting more research studies on Pahlavani wrestlers in different cities to take possible socio-cultural factors into consideration could be the future research perspective.

Conflict of interest
The authors declared no conflicts of interest.

Authors' contributions
All authors contributed to the original idea, study design. AJ, RH, HP, and EA conceptualized and designed the study. AJ, RH, and EA collected the data. AJ, RH, HP, and EA participated in the formal analysis. EA wrote the original draft of the manuscript. AJ, RH, and HP reviewed and edited the manuscript. All authors approved the final version of the manuscript.

Ethical considerations
The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc. This study was a part of a National Scientific Project supported by the "Zurkhaneh Sports and Koshti Pahlavani Federation" under the code number: *21/7327* in 2021. All aspects of the study were approved by the scientific research committee of the Federation. We tried to apply all ethical measures to ensure

the confidentiality of the study. Also, the whole experimental procedure was described to the participants and then they signed the informed consent form to participate in this study.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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