







## Discussion

BMI considered as an appropriate indicator for evaluation of nutritional status.<sup>[14]</sup> Limited researches on the prevalence of overweight and obesity among Iranian adolescents showed inconsistent results. In a recent study, the prevalence of overweight and obesity was the lowest in Zahedan (3.1% and 0.6% respectively) and Shahr-Kurd (6.2% and 2.3% respectively), intermediate in Shiraz (11.3% and 2.9% respectively) and Tabriz (11.1% and 2.9% respectively) and the highest in Tehran (21.1% and 7.8% respectively) and Ghom (18.4% and 7.3% respectively).<sup>[20]</sup> Differences observed between estimated overweight of 12.9% in the adolescent girls of Arak in the present study and those reported earlier in the case of Shiraz and Tabriz were not significant but they had significantly the higher rate of overweight than adolescent girls of Zahedan and Shahr-Kurd. On the other hand, the prevalence of obesity among these students (1.4%) was significantly lower than that of Tehran and Ghom high-school girls. Variation observed in the prevalence rates of overweight and obesity may be due to differences in the socio-economic status, nutritional habits, and physical activity level of participants. In previous studies, the prevalence of obesity among students of Saudi Arabia aged from 6 years to 18 years was estimated to be 15.8%.<sup>[21]</sup> In Turkey, the overall prevalence of underweight, overweight, and obesity among girls was 11.1%, 10.6% and 2.1%, respectively.<sup>[22]</sup> Among adolescent girls in Syria, the prevalence of overweight and obesity was reported to be 18.9% and 8.6%, respectively.<sup>[23]</sup> In another study in Qatar, the prevalence of underweight, overweight, and obesity was 5.8%, 18.9%, and 4.7%, respectively.<sup>[24]</sup> The high-rates of excess weight among the adolescents of the Middle-East including, our country may be resulted from the rapid changes in the life-style.

Comparing results of the present study with those of neighboring countries, the prevalence of overweight and obesity in Iran is similar to that of Turkey.<sup>[22]</sup> Keep in mind that in recent years underweight was a major health problem in Iran, the lower prevalence rate of excess weight among the adolescent girls of Arak than that of some neighboring countries is even alarming. Recently, life-style changes in Iran resulted in the higher consumption of simple sugars and fats and the lower physical activity level.

Due to the increasing prevalence of overweight and obesity all over the world, the lack of local-specific reference data especially, in developing countries is a major limitation in evaluation of nutritional status of children and adolescents because available references are provided based on the data from developed countries. Therefore, evaluation of children and adolescents growth should be performed according to the local-specific BMI percentiles.

As presented in Table 2, there were no significant differences among the nutritional knowledge of adolescent girls in the

various groups of nutritional status. However, another study in Malaysia showed that appropriate level of nutritional knowledge leads to healthier eating habits.<sup>[25]</sup> This finding is in agreement with a previous study in America in which no significant association was found between level of knowledge with respect to nutrition and the prevalence of excess weight and underweight among adolescents.<sup>[26]</sup> Similarly, Jafarirad, *et al.*<sup>[27]</sup> also reported that relationship between nutritional status of high-school girls in Sari, Iran, and their nutritional knowledge was not significant. Obese high-school girls of Semnan, Iran, had the lower level of nutritional knowledge than those with normal weight.<sup>[28]</sup> It is concluded that nutritional knowledge alone doesn't seem to be enough to determine adolescent's nutritional status and there are other factors that strongly affect their physical growth.

Results of our study revealed that the effect of parent's educational level on BMI values of high-school girls was not significant. Accordingly, Hajifaraji, *et al.*<sup>[29]</sup> found no significant association between the parent's educational level and BMI values of adolescent's girls. Furthermore, BMI in Indian girls was not in relation to their socio-economic status<sup>[30]</sup> and in China a significant association was not observed between BMI values of adolescent's girls and their parent's occupation and educational level.<sup>[31]</sup> In contrast, in a study on adolescents of Isfahan province, Iran aged from 11 years to 18 years a higher prevalence rate of excess weight among adolescents with the lower level of mother's educational level has been reported.<sup>[4]</sup> Other researchers also found a significant relationship between BMI in adolescent's girls and their parent's educational level and socio-economic status in USA<sup>[32]</sup> and Australia,<sup>[33]</sup> respectively.

As can be seen in Table 4, although, there were no statistically differences among the means of various groups, the frequency of consumption of beef, chicken, beans, yoghurt, fruits, and nuts per month in obese girls was higher than that of other foodstuffs. In a previous study on adolescents of Isfahan province, Iran a linear relationship was found between BMI and frequency of consumption of rice, bread and fast foods.<sup>[21]</sup> In fact, while many studies demonstrated a positive relationship between energy uptake and nutritive foodstuffs and body weight,<sup>[34]</sup> such relation was not observed in other ones.<sup>[35]</sup>

Despite the lower physical activity of obese girls in comparison to other groups, differences observed were not significantly different. In American adolescents, the lower physical activity level has been reported to result in the higher BMI.<sup>[36]</sup> Likewise, other studies in Iran on adolescent girls of Semnan and Tehran provinces showed that BMI trends to increase with decreasing the level of physical activity.<sup>[28]</sup>

The relation between BMI and the level of physical activity may be explained by the fact that the low-physical activity levels reduce energy metabolism and muscular activities as well as fat oxidation in body tissues which favor body excess

weight. The lack of regular physical activity and exercise is considered as an important factor in obesity development.<sup>[37,38]</sup>

In the present study, menarcheal age differed significantly between various groups of nutritional status. In this respect, Chowdhury, *et al.*<sup>[39]</sup> reported that the mean weight of menstruate girls was significantly higher than that of other ones. In another study, the mean age at menarche was significantly associated with BMI values at the age of 14 and 31 years.<sup>[40]</sup> Furthermore, the increased incidence of obesity in adulthood has been reported to associate with the lower menarcheal age.<sup>[41]</sup> In contrast to our study, however, Hui Chang, *et al.*<sup>[42]</sup> found height as a more important determinant of menarcheal age. Among the high-school girls of other studies, the mean age at menarche was lower in those of relatively high-socio-economic status. Although, there was no significant relationship between nutritive intake and their menarcheal age in some others.<sup>[39,40]</sup>

Although, association between socioeconomic status and nutritional status of adolescent girls was not significant in our study, such relation may be better understood by increasing the size of sample. Furthermore, central obesity did not measure and since WSR is a practical indicator for monitoring the weight status of adolescents,<sup>[43]</sup> it is a limitation of the current work.

## Conclusion

The prevalence of both underweight and overweight/obesity in Iranian adolescent girls are the major problems. Furthermore, nutritional knowledge has an inverse correlation with BMI status. Intervention strategies that increase the level of nutritional knowledge in adolescent girls and their parents, along with encouragement to increase physical activity levels may finally result in healthier nutritional status of adolescents.

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