# Relationship Between Nonverbal Intelligence (IQ) and Height in Adult Males and Females

## *YETİŞKİN KIZ VE ERKEKLERDE NONVERBAL ZEKA (IQ) VE BOY ARASINDAKİ İLİŞKİ*

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**Summary**

Scientific researches concerning the relationship between IQ and body size in human being have been carried out. In our study it was aimed to discuss the testosterone, growth hormones and thyroid hormones which are assumed to have an influence in the relations between IQ and body height in both young males and females, and the effects of these hormones according to the present literature information. It was also aimed to research the difference of sex in the relation of cognitive abilities and body height.

The male and female subjects (17-19 years old), who were participated in our study, were chosen from the students of Medical School of Black Sea Technical University. The IQs of the subjects were determined by using Cartel's Culture Fair Intelligence Test. The heights of the subjects were measured meticulously by using centimetric system. The statistical analyses were evaluated by means of SPSS for windows (Version 9.0) package programme.

In male subjects a positive linear significant correlation between IQ and body height was found (r= 0.33; p= 0.002). However, in female subjects a less significant relationship in proportion to male subjects but a positive linear significant correlation between IQ and body height was found (r= 0.29; p= 0.028).

According to these results, the relationship between IQ and body height in male and female subjects was thought to have been able to come about before the period of intrauterin and puberty in accordance with genetically determined patterns through the contribution of some neurotrophic and gonadal hormones.

**Key Words:** Nonverbal intelligence, Height, Testosteron, Growth hormone, Thyroid hormones

T Klin J Med Res 2001, 19:126-130

**Özet**

İnsanda nonverbal zeka (IQ) ve vücut boyutları arasındaki ilişkileri içeren bilimsel çalışmalar yapdmaktadır. Çalışmamızda genç kız ve erkeklerde IQ ve vücut boyu arasındaki ilişkilere etkisi olduğu varsayılan testosteron, growth hormonları ve tiroid hormonlarının mevcut literatür bilgilerine göre bu etkilerinin tartışılması amaçlandı. Ayrıca bilişsel yetenekler ve vücut boyu ilişkisinde cinsiyet farkının araştırılması amaçlandı.

Çalışmadaki 17-19 yaş grubundaki kız ve erkek denekler, Karadeniz Teknik Üniversitesi Tıp Fakültesi öğrencilerinden seçildi. Deneklerin IQ'ü Cartel's Culture Fair Intelligence Test kullanılarak belirlendi. Denek boyları ise santimetre cinsinden hassas olarak ölçüldü. İstatistiki analizler SPSS for windows (Version 9.0) paket programında değerlendirildi.

Erkek deneklerde IQ ve boy arasında anlamlı pozitif doğrusal bir ilişki bulundu (r= 0.33; p= 0.002). Kız deneklerde ise IQ ve boy arasında erkeklere nazaran daha az anlamlı fakat yine pozitif doğrusal bir ilişki bulundu (r= 0.29; p= 0.028).

Bu sonuçlara göre kız ve erkek deneklerde IQ ile boy arasındaki bu ilişkinin, intrauterin ve puberte öncesi dönemde genetik olarak belirlenmiş kalıplara uygun şekilde bazı nörotrofik ve gonadal hormonların katkılarıyla gerçekleşmiş olabileceği düşünüldü.

**Anahtar Kelimeler:** Nonverbal zeka, Boy, Testosteron, Growth hormon, Tiroid hormonları

T Klin Araştırma 2001, 19:126-130

Received: Nov. 22, 2000

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The relationship between physical height and success in human being has been the topic of a series of interesting observations. For example in 1916, Gowin suggested that more respected and successful of those, working in the same general branch of labour, are taller than less successful ones

(1). Since 1900 the taller candidates have won the seventeen of twenty one presidential elections in the USA (2). Furthermore, there are evidences concerning the children who are getting matured rapidly have higher IQ scores than those getting matured at a normal speed (3,4). However, many authors have tried to build up ties among the several measurements of functions of intelligence and height in normal population. For example, Porter reported in his studies on 33.500 students of the same age that the students who are taller and fatter showed more successful activity than the shorter and thinner ones (5). Douglas et al. found significant relationships between IQ scores and height in 5362 English children (6). Miller found significant relationships between the results of IQ and height in 762 students who had been observed longitudinally (7). Scott reported that there was a significant correlationship between height and IQ scores, and furthermore he emphasized the effects of family size on both IQ scores and height scores (8). Darell M.Wilson et al. searched both the relationship between height and IQ and the other factors that might impair this relationship and were related to testing the results of intelligence in their studies. Among these factors were there socioeconomic status, race, family size, order of birth and physical maturity (9). In spite of the studies mentioned above, Richards et al. didn't find any relationship between height and IQ scores in their studies on 481 students of the seventh grade (10).

Under the light of information mentioned above we carried out this study among male and female students of close age-groups of medical school so as to point out the relationship between IQ and height. In our study it was aimed to discuss the type of relation which could be existed between nonverbal intelligence (IQ) and body height and the possibility of testosterone, growth hormones and thyroid hormones that might affect this relation under the light of the present literature information (see discussion). It was also aimed to research the difference of sex in the relation of cognitive abilities and body height.

## Materials and Methods

The subjects who were involved in this study were chosen among the male and female students of medical school of Black Sea Technical University. The subjects, eighty eight of whom were male and fifty six of whom were female, participated in this study voluntarily. None of these subjects whose average age was between 17 and 19 had any psychiatric or neurological signs and symptoms.

The differences among the nonverbal -spatial reasing abilities of the subjects were realized by using Cattell's Culture Fair Intelligence Test (11,12). 95% confidence intervals of the test were between 115.03 and 119.27. Scala 3A was used as a group test. The transformation of unappreciated scores into intelligence quotiens directly was realized by using the table (13). The heights of the subjects were determined by measuring meticulously in centimetres.

A package program called SPSS for windows (Version 9.0) was used for statistical analyses. The linear relationships between dependent variable IQ and independent variable height were evaluated in boy and girl subjects.

## Results

In young male adults the relationship between IQ and height was shown in Figure 1. It has been shown that there is a positive significant linear relationship between dependent variable IQ and independent variable height (r= 0.33; p= 0.002). According to this relationship there is an increase in IQ scores of male subjects depending on the length of height.

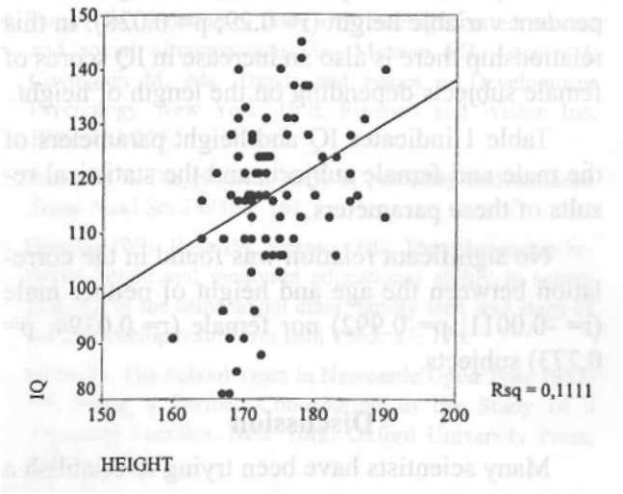


**Figure 1.** Relationship between **IQ** (nonverbal intelligence) and height in young adults males.

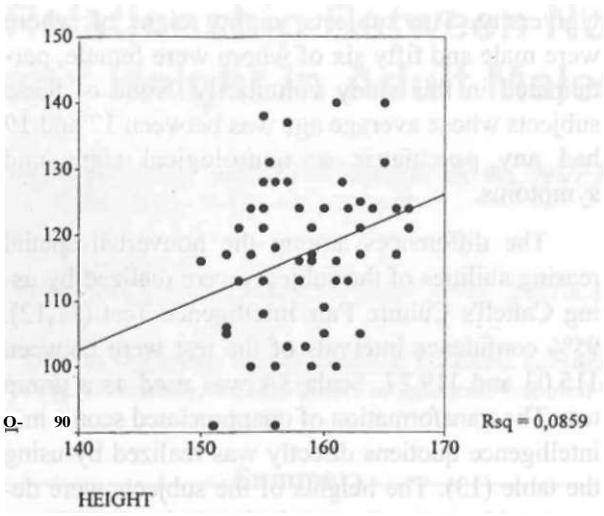


**Figure 2.** Relationship between IQ (nonverbal intelligence) and height in young adult females.

**Table 1.** Statistical results of IQ and height variables of the male and female subjects.

| | n | IQ | Height |
|---|---|---|---|
| Male | 88 | 117.21 ± 13.80 | 173.72±5.76 |
| Female | 56 | 117.03 ±11.55 | 158.40±4.30 |
| Significance | 144 | p > 0.05 | p < 0.05 |

Figure 2 shows the relationship between IQ and height in female subjects. As it is seen in the figure, there is a less positive significant linear relationship between dependent variable IQ and independent variable height (r= 0.29; p= 0.028). In this relationship there is also an increase in IQ scores of female subjects depending on the length of height.

Table 1 indicates IQ and height parameters of the male and female subjects and the statistical results of these parameters.

No significant relation was found in the correlation between the age and height of neither male (r= -0.0011; p= 0.992) nor female (r= 0.0394; p= 0.773) subjects.

## Discussion

Many scientists have been trying to establish a relationship between several paramètres of function of IQ and height in normal population. In 1892 Porter determined over 33.500 students of the same age group that those who were taller and fatter than those who were less tall and fat were academically more successful (5). The data concerning 6921 children of age 11, born in 1936, offered by Scottish Intelligence Research Institution, determined the correlation between height and IQ scores both in boys and girls (r= .24, boys; r= .2(5, girls) (14). Belmont et al. reported that both family size and birth order impressed IQ and height scores in a complex way (15).

Darrel M et al. did research on the relationship between height, the scales of intelligence development (Wechsler Intelligence Scale for Children) and academic achievement (Wide Range Achievement Test) in a study on 13.887 people of ages 6 to 17 (9). In this study, firstly a research was carried out on 2177 people, who were in a certain age group. The same study was repeated 2 or 5 years later. It was seen in both groups that Wechsler intelligence scale for children and Wide Range Achievement had significant relationships with height. These results have maintained their significance even though the factors such as socioeconomic status, race, family size, birth order and relatively physical maturity which have affected IQ scores have been kept under control. For example researchers have pointed out that relatively maturity didn't influence IQ scores.

This relationship between height and doubtful intelligence conjectures related to the factors which affect intelligence doesn't seem restricted in the period of childhood and adolescence. These significant relationships between height and intelligence were also found in the studies on adults (4). These studies, despite each one's methodological faults, have suggested that the relationship between IQ and height in the period of childhood is also insistent in adults but doesn't reflect temporary differences in physical maturity or growth. Results of our study also conform to the studies carried out in adults.

Darrel et al. couldn't find any relationship between changes in height scores and changes in IQ scores in their studies on longitudinal subgroups (9). These results make you think the period which contributes the relationship between IQ and height lasts relatively in the early years of childhood.

In intrauterin life the existence of neurotrophic factors which influence the brain development have been discussed. Neurotrophic factors influence the development of neuron, the structure of it, the general regulation and regeneration ability of it and the formation of synaps of it (16). One of these neurotrophic factors is the growth hormone. The growth hormone has been discussed to be able to influence the development of brain and the organization of neural pattern which were determined in brain genetically in early period (17). The same hormone has been known to influence the increasing of height and the development of bones by affecting the epiphysial cartilages of long bones. The development of brain might have contributed to the development of intelligence and mean while the increasing length of bones might have contributed to the increasing of height. This approach has supported the positive linear relationship between IQ and height in our studies. Likewise, the thyroid hormones (T3,T4) which are neurotrophic factors are necessary for a normal growth and development. For example in hypothyroidism mental activity slows down (18). Thyroid hormones have been affecting the ontogenesis of brain. Namely, thyroid hormone was reported to lead to morphological and neurochemical changes in the hippocampus of newborn rodents (19,20). Tan, reported that thyroid hormones on which he did researches might have been able to influence the development of brain and lateralization differently according to genetically pre-determined cerebral organization (21). Tan determined that thyroid hormones influenced the grasp reflex activities of males more than females depending on sex since it was more effective on males. Under the light of the information mentioned above thyroid hormones have been thought to be able to influence IQ at least indirectly.

The testosterone which is a gonadal hormone has been known to contribute to the development of brain hemispheres in a different way and cause the formation of cerebral lateralization (22). Haren et al. reported that gonadal hormones were related to structural and functional organization of central nervous system (23). The testosterone hormone was reported to be an important factor influencing the cognitive development particularly in right handed males in positive direction by Tan and Akgiin (24). This relationship has been thought to be able to realize during the period of early brain development before the period of puberty. In fact, as Darrel M et al. reported, the efforts which were carried out for children's height increasing therapies haven't had any effect on IQ scores in children after the period of puberty (9).

The contribution of testosterone, especially a male gonadal hormone, on the development of body and height in males has been known. This positive effect of testosterone on IQ scores and body development in males (particularly on special abilities) is more evident than in females. As it also can be seen in the results of our studies, the relationship between IQ and height of male and female subjects is in favour of male subjects.

Under the light of the information mentioned above the positive direct relationship, which was formed by the effect of neurotrophic growth hormone, thyroid hormone and gonodal testosterone hormone before the period of puberty and intrauterin according to genetically determined patterns, between IQ and height was concluded to be more evident in males than in females.

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