# The Long Term Follow-Up of Body Mass Indexes of Neonatal Surgical Patients Fed with Total Parenteral Nutrition

## Total Parenteral Nutrisyon ile Beslenen Yenidoğan Cerrahi Hastaların Beden Kitle İndekslerinin Uzun Dönem İzlemi

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**ABSTRACT Objective:** To follow the growth hand improvement conditions of newborn (NBs) comparing the Body Mass Index (BMI) values of the NBs fed Total Parenteral Nutrition (TPN) in long period with World Health Organization (WHO) standards. **Material and Methods:** Between 2003-2006 years, 20 infants were fed with TPN and their anthropometric measurements were followed until 1 year old. Their BMI values before TPN (BMI1), after TPN (BMI2), and the 1 year old (BMI3) values were examined. The differences of BMI values over time were compared with Repeated Measures of ANOVA and Bonferroni adjusted Paired Samples t test as post hoc test. Age related BMI Z-score graphics were performed by using WHO-Anthro computer program. **Results:** Median age was 7.10 (2.00-22.00) days and median TPN duration was 14.00 (7.00-38.00) days in the group consisted of 15 females and 5 males. Comparison of BMI values was significiantly different in the three different periods (p=0.001). There was no difference between the values of (BMI-BMI2) in the Paired Samples Test independent groups. There were significant differences between the values of BMI1 (10.33±1.71) with BMI3 (14.27±1.50) and BMI2 (10.27±1.43) with BMI3. Z-scores of 2 infants before TPN and 3 infants after TPN were under -5 in BMI Z-score distribution graphic according to age and sex. BMI values of 1 year-old infants of first age were under standarts in Z-score distribution graphic according to sex. **Conclusion:** It was observed that BMI values were under the standards of WHO in NBs in our study. We think that monitoring of growth and development values of the greater number of babies fed TPN was rather beneficial to catch the standards during childhood.

**Key Words:** Infant, newborn; body mass index; parenteral nutrition, total

**ÖZET Amaç:** Total parenteral beslenme (TPN) alan yenidoğan (YD)'ların uzun dönemdeki Beden Kitle İndeksi (BKİ) değerlerini, Dünya Sağlık Örgütü (DSÖ) standartlarıyla karşılaştırarak büyüme-gelişme durumlarını izlemektir. **Gereç ve Yöntemler:** Kliniğimizde 2003-2006 yılları arasında TPN alan ve 1. yaşına kadar antropometrik ölçümleri izlenen 20 bebeğin TPN öncesi (BKİ1), TPN sonrası (BKİ2) ve 1. yaş (BKİ3) değerleri incelendi. BKİ değerlerinin zaman içindeki değişimleri tekrarlayan ölçümlerde ANOVA analizi ile yapıldı; bunun ikincil testi olarak da (post hoc), Bonferroni düzeltmeli bağımlı gruplarda Paired samples t testi kullanıldı. Yaşa göre BKİ Z skor grafikleri DSÖ Anthro bilgisayar programı yardımıyla oluşturuldu. **Bulgular:** Onbeşi erkek 5'i kız olan grubun, TPN alma yaşlarının ortanca değeri 7,10 (2,00-22,00), TPN alma sürelerinin ortanca değeri 14,00 (7,00-38,00) gündür. BKİ değerlerinin 3 farklı zaman içerisindeki karşılaştırılmaları anlamlı olarak farklı idi (p= 0,001). Bağımlı gruplarda Paired samples test ile (BKİ1-BKİ2) değerleri arasında anlamlı bir fark yoktu. BKİ1 (10,33±1,71) - BKİ3 (14,27±1,50) ve BKİ2 (10,27±1,43) - BKİ3 (14,27±1,50) değerleri arasındaki fark anlamlı bulundu. Yaşa ve cinsiyete göre BKİ Z-skor dağılım grafiğinde TPN öncesi 2, TPN sonrası 3 bebeğin Z-skoru -5'in altındaydı. Tüm bebeklerin 1. yaşta yaşa göre BKİ Z-skorun cinsiyete göre dağılım grafiğinde ise değerler standartların altında idi. **Sonuç:** Çalışmamızda TPN alan ve 1.yaşlarına kadar izlenen YD'ların BKİ'nin sayısal olarak DSÖ standartlarının altında olduğu görüldü. YD döneminde TPN alan daha fazla sayıda bebeğin, uzun dönemdeki büyüme-gelişme değerlerinin yakından izlenmesinin çocukluk döneminde, standartları yakalayabilmelerine olumlu katkılarının olacağını düşünüyoruz.

**Anahtar Kelimeler:** Bebek, yenidoğan; beden kitle indeksi; parenteral beslenme, total

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To follow the growth and improvement conditions of newborns (NBs) comparing the Body Mass Index (BMI) values of the NBs fed total parenteral nutrition (TPN) in long period with World Health Organization (WHO) standards.

## OBJECTIVE

The first two years of life is the period in which growth and development is the most rapid. Nutrition in this period is very important for mature and premature babies because it has influences on the following years.[1-3] Therefore, the essential part of the treatment protocol consists of TPN in many newborn intensive care units (NICUs).[4-6] Complication rates are considered low during TPN and TPN does not affect the rate of mortality during major surgical procedures in patients with nutritional disorders.[6-8]

## MATERIAL AND METHODS

Between 2003 and 2006, 20 infants were fed with TPN and their anthropometric measurements were followed until 1 year old. Their BMI values before TPN (BMI1), after TPN (BMI2), and the 1 year old (BMI3) values were examined. The weights of babies were detected naked on a digital scale (seca, 345). The lengths of babies were measured by a standard measurement device while they were laying on the table. The measurements were performed by an experienced NB surgical nurse who followed the clinical care of the babies.

Statistical analyses were performed by using SPSS 17.00 package program on PC. Data were expressed as mean + standart deviation or median (minimum-maximum) for normally and non-normally distributed continuous variables, respectively. The Shapiro- wilk test was applied to check that assumptions of normality were met. The differences of BMI values over time were compared with Repeated Measures of ANOVA and Bonferroni adjusted Paired Samples t test as post hoc test. Results were considered significant if $p<0.05$. However, $p<0.017$ was considered significant when bonferroni adjustment was made. Age related BMI Z-score graphics were performed by using WHO-Anthro computer program.

## RESULTS

Median age was 7.10 (2.00-22.00) days and median TPN duration was 14.00 (7.00-38.00) days in the group consisted of 15 females and 5 males. Comparison of BMI values was significantly different in three different periods (p=0.001).

**TABLE 1:** Evaluation of body mass ındexes of neonatal surgical patients.

| | | | | |
|---|---|---|---|---|
| Pair 1 | BMI1 | 10.33 | 1.71 | 0.789 |
| | BMI2 | 10.27 | 1.43 | |
| Pair 2 | BMI1 | 10.33 | 1.71 | 0.001 |
| | BMI3 | 14.27 | 1.50 | |
| Pair 3 | BMI2 | 10.27 | 1.43 | 0.001 |
| | BMI3 | 14.27 | 1.50 | |

BMI: Body mass index (kg/m$^2$).

(There was no difference between the values of (BMI1-BMI2) in the Paired Samples Test. There were significant differences between the values of BMI1 with BMI3 and BMI2 with BMI3).

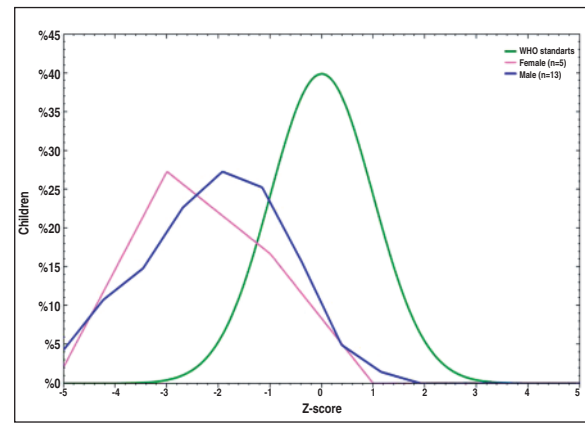


**FIGURE 1:** BMI Z-score distribution graphic according to age before TPN in all babies. Z- scores of two babies were under -5 [(-7.09 and-5. 09)].

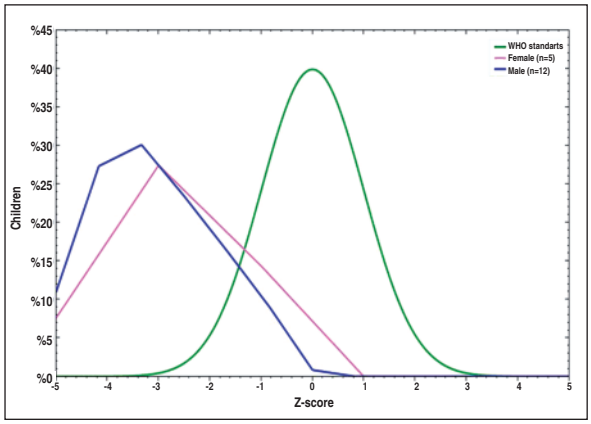


**FIGURE 2:** BMI Z-score distribution graphic according to age after TPN in all babies. Z-scores of three babies were under -5. [-7.14 (male), -5.30 (male), -5.96 (male)].

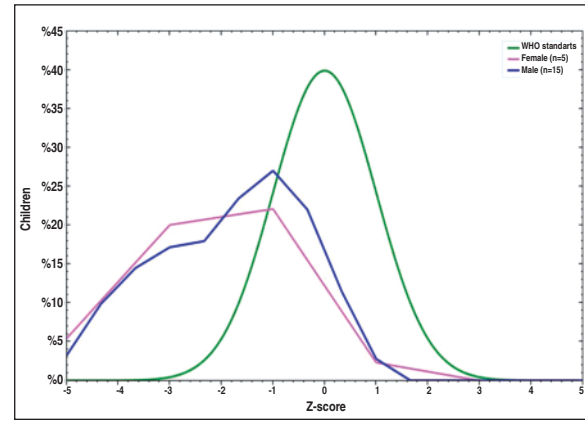


**FIGURE 3:** BMI values in first age in all babies were under standards in Z-score distribution graphic according to age and sex.

## DISCUSSION

Nutritional support in pediatric surgery and especially NICUs is important considering postnatal neural development, surgical result, and shortening the length of stay in hospital.[6,9] The aim of studying of the growth and development in children is to protect the rights of children ensuring their physical, mental social and emotional developments.[2] The early use of aminoacids accelerates the growth and it affects the neuro-growth outcomes positively. There are many evidences in this subject.[5,9]

In our study, we think that not being able to find any significant difference between BMI1-BMI2 values might be correlated with the short duration of TPN application and the limited number of patients (Table 1). On the other hand, a significant increase was observed between BMI1-BMI3 and BMI2-BMI3 values in parallel with the age (Table 1) (Figures 1-3). At the same time nutrition, familial, and cultural differences are important for the growth of the children between 0-1age.

Increasing in the values was satisfying, however at the end of the first age the measurements of the babies were below the standards showing BMI-Z score distribution according to the gender. This situation was upsetting. These results made us think that long term observation of the babies with parental feeding in NICUs is important. On the other hand, it made us think about "do the newborns fed TPN because of gastrointestinal (GIS) integrity breakdown have GIS motility problems in their future lives?" "How much were their low growth values related to with this situation?" However, no article could be found in literature evaluating the results of growth in the long term after TPN. The success in pediatric surgery is related to the preoperative and postoperative intensive care in addition to the right surgical indication and techniques.[4,6]

## CONCLUSION

It was observed that BMI values were under the standards of WHO in NBs fed TPN and followed until the first age in our study. We think that monitoring of growth hand development values of the greater number of babies fed TPN was rather beneficial to catch the standards during childhood.

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