

Comparison of Fetal Behavior in Single and Twin Pregnancies with the Use of KANET Test

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ABSTRACT

Aim: According to the results of the Kurjak antenatal neurodevelopmental test (KANET) in comparison of fetal behavior in single and twin pregnancies with the use of KANET test.

Materials and methods: Between May 2015 and December 2019, 66 low-risk single pregnancies were assessed with KANET, along with eight twin pregnancies between 28 and 38 weeks of gestation.

Results: Out of 66 patients with single pregnancies, 64.02 (97%) had a normal KANET score, and 1.8 (3%) of them had a borderline KANET score. Out of eight patients with twin pregnancies, 7.84 (98%) had a normal KANET score and 0.16 (2%) of them had a borderline KANET score.

Conclusion: Our data suggest that twins show different types of motility than singletons at the same gestational age. The difference in the number of normal, borderline, and abnormal KANET scores between singletons and twins was not statistically significant, although the differences were found in certain parameters of the test between singletons and twins. It could be concluded that movements in twins become more complex and occur more frequently with increasing gestational age.

Keywords: Fetal behavior, Four-dimensional ultrasound, General movements, Growth and development, Twin pregnancies.

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INTRODUCTION

The assessment of fetal behavior using four-dimensional ultrasound (4D US) indirectly monitors the maturation and staged development of the central nervous system (CNS).¹ Behavior is the attribute of a functional CNS. Fetal expressions may offer insight into the function and development of the fetal brain in the second half of pregnancy.² These expressions reflect the maturation and development of different parts of the CNS controlling these actions.^{3,4}

The 4D US assessment of fetal behavior and facial expressions, as well as studying the usefulness of the KANET, represent a diagnostic criterion for prenatal brain injury and may be a useful diagnostic method when predicting postnatal developmental disabilities.^{1,3,5}

Multiple pregnancies are high-risk pregnancies due to many risk factors which can adversely affect pregnant

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women, fetuses, and the newborn.^{4,6,7} The main issues that affect neonatal outcomes of multifetal pregnancies include preterm delivery, low birth weight, and intrauterine growth retardation. In 2006 in the United States of America, 11% of singletons were premature (<37 weeks gestation), while 61% of multiples were premature, combining for a total preterm delivery rate of 12%.⁸ Low birth weight rate

was 6% in singletons and 59% in multiples, with a total low birth rate of 8%.⁸ The percentage of very low birth weight neonates (birth weight below 1500 gm) was 1% in the whole population of newborns, while it was 11% in multiples.^{4,8} The risk for cerebral palsy (CP), the most common lifetime neurodevelopmental disability in childhood, increases with decreasing gestational age and birth weight. Twin pregnancies are associated with increased risk of CP not only because of increased prematurity rate but also due to vanishing twin phenomenon). The prevalence of CP among twins is 7.4%, while in singletons, it is estimated to be 2–3/1000 live borns.⁹ The prevalence of CP in triplets and quadruplets is increasing exponentially with the number of fetuses.^{4,9} The highest difference in the incidence of CP between singleton and twin births was at gestational age of 37 weeks and more.⁹ Thus, early detection of neurological impairment might be of some significance from the obstetrical point of view.⁴

AIMS

- The aim of the KANET test is to evaluate the motional activity of the fetus and thus monitor the neurological development of the fetus.
- The importance of KANET in detecting twin fetuses who might be at risk for neurological problems was the study's main objective.
- To compare the results between the singleton and twin pregnancy groups.

MATERIALS AND METHODS

In the period from May 2015 to December 2019, KANET was administered to 66 pregnancies in a single pregnancy with low risk and eight twin pregnancies between 28 and 38 weeks of pregnancy. The gestational age estimated for the 1st day of the last menstruation was confirmed by US evaluation. Fetal behavior was estimated using 4D US Voluson E6 and S10 with a 5 MHz volumetric transabdominal probe. It was performed by one doctor. All pregnant women have signed informed consent to the study. The trial was conducted in the private gynecological clinic "Korak do Života" in Tuzla, Bosnia and Herzegovina.

Inclusion Criteria

Two requirements for inclusion were the existence of a viable twin pregnancy and the absence of a significant size difference between the twins as verified by US.

Exclusion Criteria

- Family history: A previous child with CP.
- Personal pregnancy history: Diabetes mellitus type 1 and 2, hypertension, drug abuse, thrombophilia, anemia, infection during pregnancy, and first pregnancy after 35 years.
- Pregnancy disorders: Polyhydramnios, premature births, intrauterine infections, and viral diseases.

- Fetal state: Intrauterine growth restriction, abnormal cardiotocography, biophysical profile, and Doppler.

After detailed two-dimensional measurements of fetal growth and examination of the placenta and amniotic fluid, mothers were offered fetal behavior estimation using the KANET scoring system using 4D US. The study was conducted while the fetuses were awake.

The maximum viewing time is 30 minutes. KANET borderline results were repeated in 2 weeks until birth. Patients with an abnormal outcome of KANET were hospitalized due to intensive monitoring of pregnancy, time planning, and termination of pregnancy by birth.

RESULTS

In this prospective longitudinal study, KANET was administered to 66 pregnancies in single pregnancies between 28 and 38 weeks of gestation. In the twin pregnancy group, there were eight pregnant women, all of them diamniotic and dichorionic. Five of the pairs were spontaneous, while the remaining three pregnancies were achieved by assisted reproductive

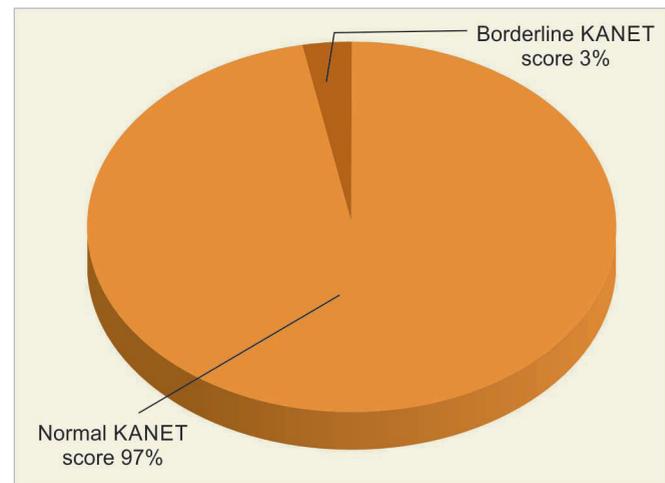


Fig. 1: KANET scores in single pregnancies (66 patients)

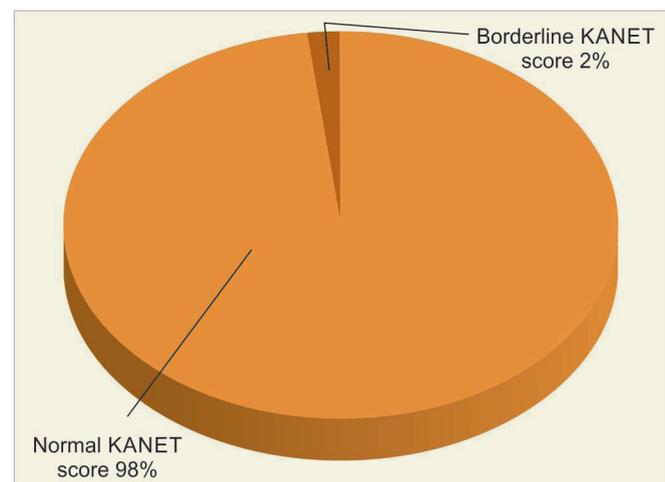


Fig. 2: KANET scores in twin pregnancies (eight patients)

Table 1: Distribution of twins and singletons according to the KANET score

Group	Number of examinees (N)	Normal	Borderline	Abnormal
Singleton	66	64.02 (97%)	1.8 (2%)	0 (0%)
Twin	8	7.84 (98%)	0.16 (2%)	0 (0%)

Table 2: KANET score between the two groups of fetuses

Kanet Parameter	Group	Kanet score		
Isolated head anteflexion	Singleton twins	0	1	2
		0	0	66
		0	0	8
Cranial sutures and head circumference	Singleton twins	0	0	66
		0	0	8
		0	0	8
Isolated eye blinking and grimacing and mouthing	Singleton twins	0	1	65
		0	0	8
		0	0	8
Isolated hand movements	Singleton twins	0	2	64
		0	1	7
		0	1	7
Hand-to-head movement	Singleton twins	0	2	64
		0	2	6
		0	2	6
Isolated leg movement	Singleton twins	0	3	63
		0	1	7
		0	1	7
Finger movements	Singleton twins	0	0	66
		0	1	7
		0	1	7

techniques. Out of 66 patients with single pregnancies, 64.02 (97%) had a normal KANET score, and 1.8 (3%) of them had a borderline KANET score (Fig. 1). Out of eight patients with twin pregnancies, 7.84 (98%) had a normal KANET score and 0.16 (2%) of them had borderline KANET score (Fig. 2). The distribution of fetuses from singleton and twin pregnancies belonging to the normal, borderline, and abnormal KANET groups is presented and was not statistically significant (Table 1). KANET score between the two groups of fetuses is presented in Table 2, which suggests that the twins are showing different behavioral patterns than singletons. Scoring of the following KANET parameters between twins and singletons differed significantly for—isolated eye blinking, mouthing, grimacing, hand-to-head movement, finger movements, gestalt perception, and general movements.

CONCLUSION

Our data suggests that twins show different types of motility than singletons at the same gestational age. The difference in the number of normal, borderline, and abnormal KANET

scores between singletons and twins was not statistically significant, although the differences were found in certain parameters of the test between singletons and twins. It could be concluded that movements in twins become more complex and occur more frequently with increasing gestational age.

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