The role of micronutrients in fertility has recently gained increased attention. We aimed to test the impact of a standardized, multinutrient supplementation on outcomes after in-vitro fertilization (IVF) / intracytoplasmic sperm injection (ICSI). One-hundred women undergoing IVF/ICSI were prospectively included and randomized to receive either a micronutrient supplementation that included folic acid, selenium, vitamin E, catechins, glycyrrhizin, diosgenin, damiana, and omega-3-fatty acids (study group; n= 50), or 400 µg folic acid (control group; n= 50). Main outcome parameters were embryo quality on day 3 after oocyte retrieval (good quality vs. poor quality) and the clinical pregnancy rate. The groups did not differ in terms of basic patient characteristics. In an intention-to-treat analyses, a higher rate of women with at least one high-quality embryo was found for the study (29/50, 58.0%) compared to the control group (18/50, 36.0%; \( p = 0.045 \)), whereas a trend toward a higher clinical pregnancy rate in the study group did not differ in a statistically significant manner (20/50, 40.0% vs. control group: 13/50, 26.0%; \( p = 0.141 \)). In conclusion, a micronutrient supplementation that includes folic acid, selenium, vitamin E, catechins, glycyrrhizin, diosgenin, damiana, and omega-3-fatty acids seems beneficial in terms of embryo quality.