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Original Article

Influences of Normative Medical Nutrition Management Based on Health Concepts on Weight Control and Maternal and Infant Outcomes in Women of Advanced Maternal Age

Fei Zhao [1,2], Bingjun Ji [3], Shuying Mu [4], *Mei Jin [1,5]

1. School of Public Health, Shandong Second Medical University, Weifang City, Shandong Province, 261053, China
2. Department of Clinical Nutrition, Sunshine Union Hospital, Weifang City, Shandong Province, 261031, China
3. Department of Radiology, Sunshine Union Hospital, Weifang City, Shandong Province, 261031, China
4. Department of Ultrasound, Sunshine Union Hospital, Weifang City, Shandong Province, 261031, China
5. Department of Clinical Nutrition, The Affiliated Hospital of Shandong Second Medical University, Weifang City, Shandong Province, 261031, China

***Corresponding Author:** Emails: wfjinmei001@qmu-edu.cn; wfjinmei001@163.com

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Abstract

Background: We aimed to explore the effects of normative medical nutrition management based on health concepts on weight control and maternal and infant outcomes in women of advanced maternal age.

Methods: Overall, 112 women of advanced maternal age were divided into the control group and observation group by random number table method. The control group was given routine intervention, and the observation group was given normative medical nutrition management based on health concepts. The nutritional status, delivery status, weight control, and adverse pregnancy outcomes were compared, and maternal mental state during delivery was evaluated by State-Trait Anxiety Inventory Questionnaire (STAI).

Results: The nutritional status of the observation group was better than that of the control group. The weight gain during pregnancy and newborn weight of the observation group were lower than that of the control group. The second stage of labor and total labor in the observation group were shorter than those in the control group were ($P < 0.05$). The spontaneous delivery rate of the observation group was higher than that of the control group; while the cesarean section rate was lower ($P < 0.05$). The S-AI and T-AI scores of the observation group were lower than those of the control group ($P < 0.05$). The incidence of adverse pregnancy outcomes in the observation group was lower than that in the control group ($P < 0.05$).

Conclusion: Normative medical nutrition management based on health concepts can help to control weight, improve nutritional status, improve anxiety, and reduce cesarean section rate and the incidence of adverse pregnancy outcomes.

Keywords: Health; Nutrition; Weight control

Introduction

Compared with women of appropriate maternal age, the body function of parturients begins to deteriorate, which is more likely to cause complications such as gestational diabetes and hypertension during pregnancy, increase the risk of childbirth, and easily lead to postpartum hemorrhage,

neonatal asphyxia, fetal distress, and stillbirth, which seriously threatens the life safety of pregnant women and fetuses.

The nutritional status and weight control of pregnant women are closely related to pregnancy outcomes. Excessive intake of nutrition is likely to lead to large fetal size, dystonia, bleeding, etc., while too little intake of nutrition will limit the development of the fetus in utero, resulting in premature delivery and fetal malformation (1). Medical nutrition management for women of advanced maternal age can reduce the incidence of adverse pregnancy outcomes (2). Normative medical nutrition management is based on health concepts and the actual situation of pregnant women to formulate a reasonable diet and nutrition intake plan to ensure reasonable weight growth and effectively reduce the risk factors during childbirth (3).

Based on this, we analyzed the impact of normative medical nutrition management based on health concepts on weight control and maternal and infant outcomes of women of advanced maternal age in comparison with routine nursing procedures, so as to provide a reference for formulating relevant intervention measures to help women control weight, improve nutritional status, and reduce adverse pregnancy outcomes of mothers and fetus in the later stage.

Materials and Methods

Clinical Data

Overall, 112 cases of women of advanced maternal age from July 2020 to July 2022 were selected and were divided into the control group and observation group by random number table method, with 56 cases/group.

Inclusion criteria: ① Regular birth inspection; ② Women gave informed consent and signed the consent form; ③ Age ≥ 35 years old; ④ Good cognitive and understanding ability, able to cooperate with pregnancy managers. Exclusion criteria: ① Severe cardiac, liver, and renal dysfunction; ② Violent tendencies or aggressive behaviors; ③ Pregnancy termination due to traffic accidents or other accidents; ④ Multiple pregnancies; ⑤ Fetal malformation indicated by prenatal screening; ⑥ Combined with blood system diseases; ⑦ Combined with immune system dysfunction; ⑧ Combined with other serious primary and chronic diseases.

The control group was given routine intervention, and the observation group was further given normative medical nutrition management based on health concepts. Both groups were given intervention from enrollment in the study until delivery.

Control group: According to the process of antenatal examination, pregnant women were required to take antenatal examination on time, and health education was carried out to inform them of health care at different stages of pregnancy, preparation before delivery, cooperation requirements during delivery, puerperium health care, breastfeeding skills, and so on.

Observation group: 1) Optimization of antenatal examination process: Obstetricians kept two or more contact information of mothers and their husbands during the first antenatal examination to avoid loss of contact during pregnancy. WeChat IDs of all women in this group were collected, and a WeChat group was established, named Normative Medical Nutrition Management Group for women of advanced maternal age. Obstetricians further explained pregnancy safety guidance manual through text and short videos to ensure that all pregnant women were truthfully understood and mastered. In addition, obstetricians plainly informed the harmfulness of pregnancy complications, non-compliance, and exposure to toxic and harmful substances, the significance and necessity of each prenatal examination, the conditions and benefits of natural childbirth, etc. The WeChat group was managed by different obstetricians in shifts and handover was done well. Obstetricians regularly asked women about their fetal movements every day and encouraged nervous and anxious women to talk in the WeChat group and pass on experiences through collective discussion and speech. Obstetricians should timely provide emotional com-

fort and psychological support to pregnant women with negative emotions, help them establish correct thinking concepts, and severely educate all misbehaviors and habits that are easy to induce abortion and endanger the safety of mother and child, so as to encourage pregnant women to form a correct cognition and improve active cooperation. In addition to collective discussion, one-on-one communication was also conducted in the WeChat group to further communicate on privacy issues which could be solved according to professional knowledge to eliminate unnecessary concerns and worries. For pregnant women with poor compliance, obstetricians should truthfully inform the significance of antenatal check-ups to ensure the safety of mother and child and urge pregnant women to carry out antenatal check-ups. For those who have missed the antenatal check-up, obstetricians should communicate through WeChat and telephone to understand the reasons for the overdue delivery and ask whether they need on-site service. For pregnant women with complications during pregnancy, obstetricians should inform the drug name and administration method in the WeChat group, guide self-testing, and formulate a practical diet plan and exercise plan. Pregnant women with malnutrition and overnutrition during pregnancy should adjust their diets after prenatal examination or WeChat group notification.

2) Nutrition and health education: Pregnant women were regularly organized to receive health knowledge education in the hospital. There were many ways of education, including unified multimedia teaching, classroom explanation, personal demonstration, and distribution of knowledge manuals related to nutrition and health care during pregnancy. If necessary, pregnant women and their families were encouraged to jointly learn nutrition knowledge during pregnancy to promote daily nutritional supervision. When carrying out nutrition knowledge education, professional nutrition personnel should gently and patiently explain to pregnant women and their families the knowledge related to nutrition and dietary pagoda, inform pregnant women of the relationship between nutrition status and pregnancy outcome, enhance nutritional attention, and promote cooperation.

3) Medical nutrition intervention: The dietary conditions of pregnant women were evaluated according to the Guidelines for preconception care and prenatal care (2018) and Chinese residents' balanced diet pagoda (Pregnant Women) (4,5). Nutrition plan was designed according to the specific situation. The daily calorie intake of obese women was less than 126 kJ/kg, and that of normal-weight women was 147 kJ/kg. About 25% of the total calorie was fat, about 20% was protein, and about 55% was carbohydrate. Food intake was based on preferences, daily intake of high-quality protein was ensured, and a small amount of nuts was recommended. Pregnant women were asked about their dietary information, and individualized dietary adjustments were made once a month according to the pregnant women's body mass index and pregnancy test results, including intake of energy, protein, staple food, fruits, and vegetables. Pregnant women were educated once a month with food exchange method to develop nutritional recipes that meet individual needs. Also, pregnant women were informed of the importance of individualized micronutrient supplements, and micronutrient drugs such as zinc, iron, folic acid oral liquid, and vitamins were recommended according to the actual situation of pregnant women. The daily intake of calcium was 800 mg, 1000 mg, and 1200 mg in early, middle, and late pregnancy, respectively.

4) Aerobic exercise: Pregnant women were instructed to do aerobic exercise by teachers qualified as midwives. Walking, swimming, jogging, jumping aerobics, and cycling were carried out during the 16-31 weeks of the second trimester. In addition, all patients were guided to exercise abdominal muscles, thighs, ankles, waist and back, pelvic floor muscles, and bladder muscles, 30-50 min a day, 5 times a week. In the third trimester (32 weeks and above), all pregnant women exercised mainly by walking, 50 min/time, 5 times/week, and carried out pelvic floor muscle relaxation and breathing pain reduction exercises. During the second and third trimester of preg-

nancy, when pregnant women have symptoms such as abdominal pain and dyspnea, they should suspend exercise and go to the hospital to determine whether aerobic exercise intervention can be continued.

Observation indices

Protein, folic acid, vitamin A, calcium, iron, and zinc in the blood of pregnant women at 37 weeks were detected by atomic absorption spectrophotometry, and maternal weight gain (37 weeks' weight - prenatal weight) and newborn weight were recorded.

The duration of labor, postpartum blood loss, spontaneous delivery rate, cesarean section rate, and forceps delivery rate were compared.

State-Trait Anxiety Inventory Questionnaire (STAI) was used to evaluate the psychological status of women during childbirth (6), including State-Anxiety Inventory (S-AI), Trait-Anxiety Inventory (T-AI), each scale contains 20 items, each item is 0 to 4 points, the higher the score indicates the more serious anxiety.

Adverse maternal and fetal pregnancy outcomes: The incidence of adverse maternal and fetal pregnancy outcomes such as abortion, stillbirth, premature delivery, low birth weight infants, macrosomia infants, congenital abnormalities, stillbirth, and neonatal asphyxia were compared.

Data analysis

All data were processed by SPSS 22.0 software (IBM Corp., Armonk, NY, USA). Enumeration data were expressed as percentages for which comparative analysis was done with χ^2 test. Measurement data were expressed as ($\bar{x} \pm s$) after normality test, for which comparison was performed with t-test. $P < 0.05$ meant that the difference was statistically significant.

Results

Clinical data did not show a statistically significant difference between the two groups (Table 1).

Nutritional status

The nutritional status of the observation group was better than that of the control group ($P < 0.05$, Table 2).

Table 1: Comparison of clinical data between the two groups

Indicators	Observation group (n = 56)	Control group (n = 56)	χ^2/t	*P*
Age (yr)	38.95 ± 2.18	39.02 ± 2.35	0.163	0.87
Gestational age (weeks)	16.31 ± 2.16	16.39 ± 2.21	0.194	0.847
Pregnancy number	2.17 ± 0.35	2.21 ± 0.32	0.631	0.529
Primipara	39	37	0.164	0.686
Preconception BMI (kg/m²)	21.38 ± 2.86	21.67 ± 2.79	0.543	0.588
Education level			0.144	0.705
College or above	29	31		
High school and below	27	25		
Smoking	7	9	0.292	0.589
Drinking	11	9	0.622	0.622
Adverse pregnancy history	8	7	0.077	0.781
Complications of pregnancy	14	12	0.2	0.654

Table 2: Comparison of nutritional status between the two groups

Groups		n	Protein	Folic acid	Vitamin A	Calcium	Iron	Zinc
Observation group		56	94.27 ± 15.03	14.68 ± 2.39	916.35 ± 86.29	892.02 ± 127.43	39.41 ± 5.68	17.96 ± 3.15
Control group		56	78.08 ± 19.37	10.34 ± 1.86	785.16 ± 71.05	791.33 ± 109.16	32.13 ± 5.39	14.13 ± 2.78
t			4.942	10.724	8.783	4.491	6.957	6.822
P			< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Maternal weight gain and neonatal weight

Maternal weight gain and neonatal weight in the observation group were lower than those in the control group ($P < 0.05$, Fig. 1).

Labor time and bleeding

The second stage of labor and total labor in the observation group were shorter than those in the control group were ($P < 0.05$, Fig. 2).

Delivery modes

The spontaneous delivery rate of the observation group was higher than that of the control group, and the cesarean section rate was lower ($P < 0.05$, Table 3).

Mental state

The S-AI and T-AI scores of the observation group were lower than those of the control group were ($P < 0.05$, Fig. 3).

Adverse pregnancy outcomes

The incidence of adverse pregnancy outcomes in the observation group was lower than that in the control group ($P < 0.05$, Table 4).

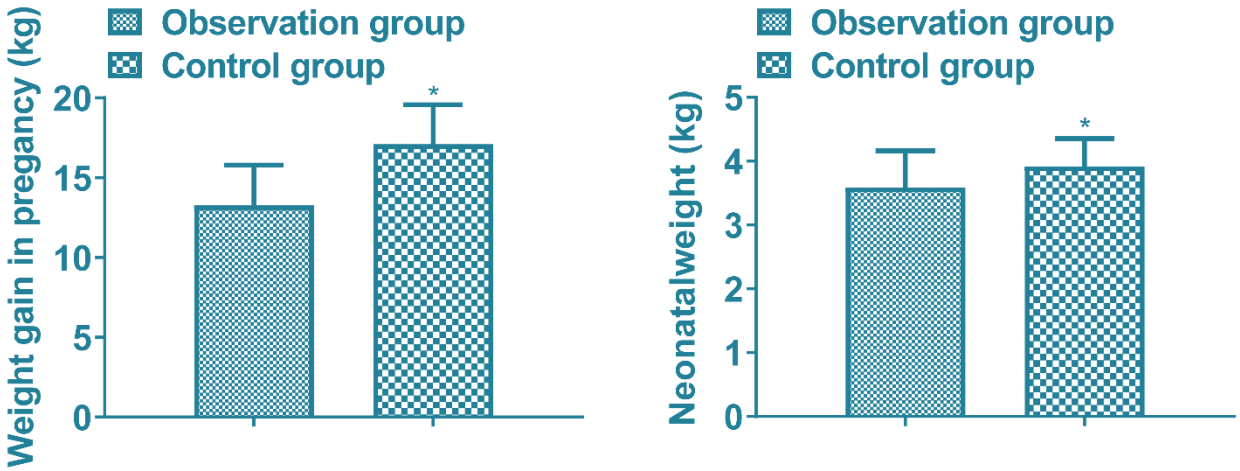

Fig. 1: Maternal weight gain and newborn weight

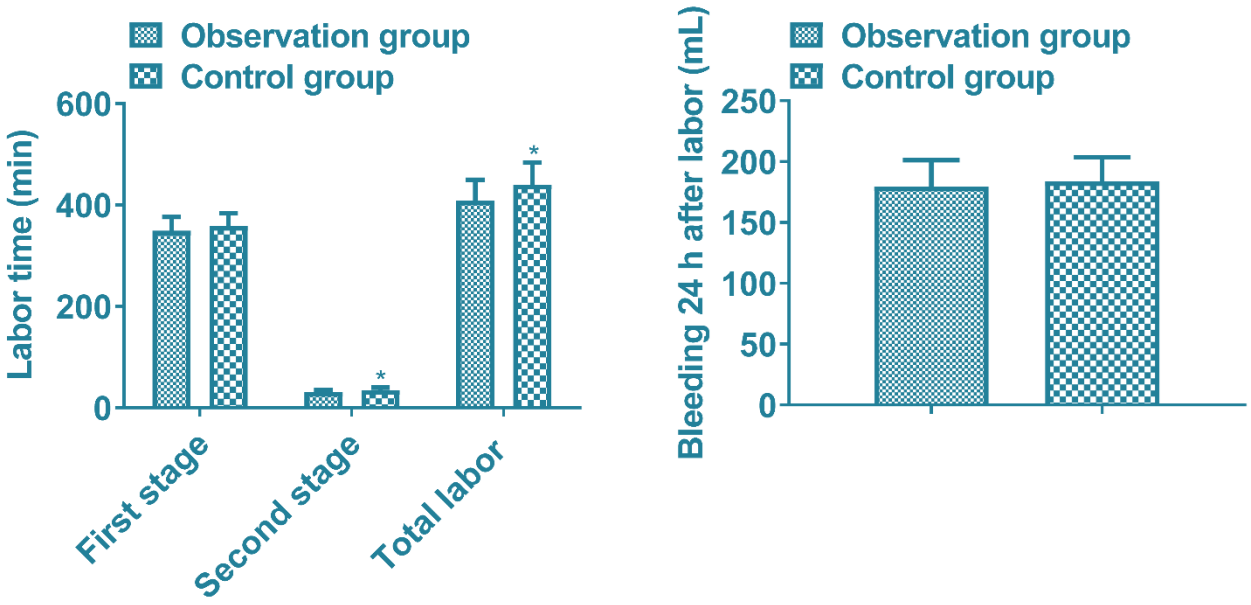

Fig. 2: Labor time and postpartum blood loss

Table 3: Comparison of delivery modes between the two groups (n, %)

Groups	n	Spontaneous delivery	Cesarean section	Forceps delivery
Observation group	56	41 (73.21)	11 (19.64)	4 (7.14)
Control group	56	30 (53.57)	21 (37.50)	5 (8.93)
χ^2		4.655	4.375	0.121
P		0.031	0.036	0.728

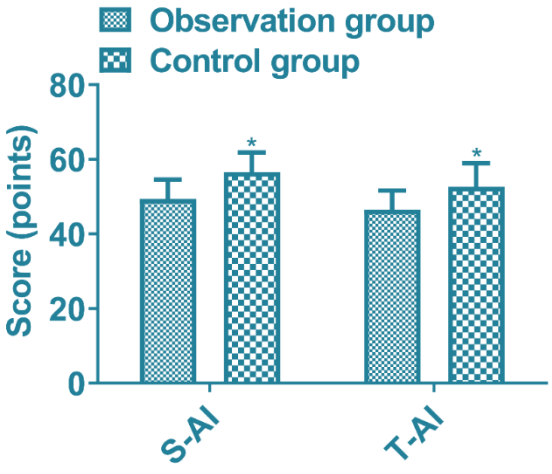

Fig. 3: STAI scores compared with the control group, * $P < 0.05$

Table 4: Comparison of pregnancy outcomes between the two groups (n, %)

Groups	n	Premature delivery	Macrosomia	Neonatal asphyxia	Placental abruption	Total incidence
Observation group	56	1	0	0	1	3.57 (2)
Control group	56	2	5	1	2	17.86 (10)
χ^2						5.973
P						0.015

Discussion

National Health Commission of the People's Republic of China pointed out that with the implementation of the universal two-child policy, the proportion of mothers of advanced maternal age showed a significant increase, which further increased the number of premature babies (7). According to relevant clinical data statistics, the incidence of gestational diabetes in women of advanced maternal age in China is increasing year by year, which seriously threatens the health of mothers and infants (8). In addition, age has become an independent risk factor affecting maternal and infant outcomes. When the maternal age exceeds 35 years old, the aging rate of oocytes is accelerated, which will not only reduce the pregnancy rate but also increase the risk of fetal abnormalities, such as abortion, premature delivery, and fetal malformation (9).

At present, with the improvement of living conditions and material living standards, the number of pregnant women with high body mass index during pregnancy has gradually increased. At the same time, high body mass index is the main reason for the increase of cesarean section rate, and it is closely related to gestational diabetes, hypertension, and neonatal deformity. Moreover, women of advanced maternal age are more likely to have nutritional problems. Clinically, it is believed that despite the rapid development of modern medical technology, the risk factor of fertility in advanced age is greatly reduced, but there are many fertility problems during the whole pregnancy. Therefore, it is particularly important to strengthen prenatal health care and guidance (10). Normative medical nutrition management refers to the implementation of personalized dietary guidance and nutrition management according to the conditions of women of advanced maternal age, and consultation and guidance on the dietary structure of pregnant women during pregnancy, so as to make the dietary content and goals more clear and scientific (11,12). This study found that the nutritional status of the observation group was better than that of the control group, indicating that normative medical nutrition management based on health concepts can improve the nutritional status of women of advanced maternal age. The reason is that during the intervention, pregnant women were regularly organized to receive health knowledge education to improve their understanding of basic knowledge related to nutrition during pregnancy, and then the dietary situation of pregnant women was evaluated, based on which a targeted nutrition plan was formulated according to preferences and daily intake of high-quality protein was ensured to improve maternal nutrition.

Due to the lack of knowledge about pregnancy, it is difficult for most women of advanced maternal age to carry out reasonable nutritional supplements, resulting in excessive, insufficient, or unbalanced nutrient intake, insufficient nutrient intake, leading to unreasonable changes in the body quality of pregnant women and affecting their own health status. Since the fetus grows and develops by absorbing maternal nutrition in the womb, the nutritional status of pregnant women will also have a great impact on the fetus (13,14). Insufficient nutrient intake will limit the growth and development of the fetus, which will have a serious impact on neonatal intellectual and physi-

cal functions, while excessive nutrient intake will lead to the emergence of macrosomia, which is not only detrimental to the health of the fetus itself, but also make it more difficult for pregnant women to deliver, easily cause dystocia, and massive bleeding (15,16). In this study, maternal weight gain during pregnancy and neonatal weight in the observation group were smaller than those in the control group, and the second stage of labor and total labor in the observation group were shorter than those in the control group, suggesting that the intervention method adopted in this study could help maternal weight control and shorten labor time. This is mainly because the normative medical nutrition management based on health concepts can effectively adjust the energy supply structure of pregnant women and promote a comprehensive and balanced intake of nutrition by providing one-to-one guidance to pregnant women, paying close attention to the changes in their vital signs, and formulating targeted diet and nutrition intake programs according to the different conditions of pregnant women. The blind intake of excessive high-energy and high-fat diet during pregnancy can be avoided, and the incidence of irrational upward adjustment of maternal weight can be reduced. On the other hand, a lower fetal weight can help shorten labor time.

Conception and pregnancy is a very complex and coordinated physiological process. During the 40 weeks from conception to the delivery of the fetus and its appendages, the combined effects of various internal and external factors often affect the mother and fetus (17). Early statistical surveys found that a large number of pregnant women often lack the awareness of health care and nutrition, and some pregnant women blindly consume excessive high-energy and high-fat diets during pregnancy, which may lead to an unreasonable increase in maternal weight and increase the rate of dystocia and cesarean section (18). The cesarean section rate of women of advanced maternal age is much higher than that of women of the right age. However, women of advanced maternal age can give birth naturally through scientific evaluation and pregnancy management (19,20). Clinical reports point out that actively promoting comprehensive pregnancy management is of great significance for improving maternal and infant outcomes of women of advanced maternal age (21). Normative medical nutrition management can effectively prevent and reduce pregnancy complications, carry out birth defect screening, and early intervention, and ultimately ensure the safety of mothers and fetuses. It not only allows women to have a correct understanding of pregnancy but also greatly improves the experience of childbirth. The results of this study showed that the spontaneous delivery rate in the observation group was higher than that in the control group, the cesarean section rate was lower, and the incidence of adverse pregnancy outcomes of mothers and fetuses was lower. By relying on the constructed WeChat group, we can always know the actual situation of pregnant women, urge them to give birth according to the pre-examination time, and create a supervision atmosphere to ensure that pregnant women are always under effective supervision. This provides a strong guarantee for satisfactory maternal and infant outcomes. In this study, the exercise guidance given to women of advanced maternal age through WeChat can enhance their immune capacity on the one hand, and fully exercise their pelvic and lower body muscles on the other hand.

In the process of comprehensive management, we actively promote the exercise of correcting the hip circumference of the fetus, and formulate scientific exercise programs according to the actual situation of each woman, so as to fully exercise the pelvis and lower body muscles, and thus improve the spontaneous delivery rate. In addition, the S-AI and T-AI scores of the observation group were lower than those of the control group, indicating that the intervention could reduce the anxiety level of patients during childbirth, which was mainly related to the reduction of cesarean section rate and the incidence of adverse pregnancy outcomes. In addition, the improvement of maternal negative emotions also promotes the smooth progress of childbirth.

Conclusion

Normative medical nutrition management based on health concepts could control weight, improve nutritional status, improve anxiety, and reduce the rate of cesarean section and the incidence of adverse pregnancy outcomes.

Journalism Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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