



The effect of theoretical and student-centered interactive education on intern nursing students' knowledge and consideration regarding human papillomavirus and its vaccine in Turkey: A repeated measures design

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Abstract

Background: Intern nursing students not only belong to the high-risk group for human papillomavirus (HPV) infection and its associated complications but also represent the future healthcare workforce. Therefore, they constitute a significant group that should comprehensively understand HPV and its vaccine.

Objective: This study aimed to assess the impact of educational interventions on intern nursing students' knowledge and considerations related to HPV and its vaccine.

Methods: A repeated measures design with pretest/posttest measures was employed. The study involved 88 students at a university in Turkey and was conducted between November 2021 and February 2022. Data were collected using a Personal Information Form and the HPV Information Scale. All participants received theoretical and student-centered interactive education, and data were analyzed using numerical data, percentage distributions, Bonferroni correction, and one-way repeated measures ANOVA.

Results: The total score of the scale and the scores of all four sub-dimensions obtained in the first and third months after the education were significantly higher than those obtained before the education ($p < 0.001$). Additionally, the proportion of students considering getting an HPV vaccine increased following the education ($p < 0.001$).

Conclusions: The education on HPV and its vaccine potentially improved students' knowledge levels and increased consideration for vaccination. Implementing interventions that equip nursing students with sufficient knowledge about HPV and its vaccine can contribute to reducing HPV-related cancer rates. Therefore, it is recommended to implement educational programs focused on the prevention of HPV-related cancers.

Keywords


Human papillomaviruses; nursing students; papillomavirus vaccines; papillomavirus infections; Turkey; workforce; vaccination

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Background

The Human Papilloma Virus (HPV), the most prevalent sexually transmitted infection worldwide, can lead to the development of genital warts, as well as anal, penile, and cervical cancers in women. Studies suggest that over 80% of individuals will likely encounter HPV in their lifetime (Grandahl et al., 2018). HPV is accountable for more than 30% of all cancer cases caused by infections in humans (Araldi et al., 2018). According to the International Agency for Research on Cancer, HPV-related cancers make up 1% of male cancer cases and 5-10% of female cancer cases. Notably, HPV-related cancers appear to affect women in Turkey more, with approximately five times higher incidence in women than in men (The Republic of Turkey Ministry of Health, 2016).

On a global scale, cervical cancer stands out as the predominant type of cancer associated with HPV. The World

Health Organization (WHO) reports that in 2020, around 604,000 women were diagnosed with cervical cancer, resulting in 342,000 fatalities, with over 95% of these cases attributed to HPV (WHO, 2021a). In Turkey, it is estimated that approximately 2,532 new cases of cervical cancer are diagnosed each year (2020 estimates). Cervical cancer ranks as the 5th most common cancer in women aged 15-44 and the 12th most common cancer in women of all age groups in Turkey (Bruni et al., 2023a).

Other HPV-related cancers that frequently affect women include anal, vulvar, and vaginal cancers, while men are more commonly affected by anal, penile, and oral cavity cancers (Bruni et al., 2016; Centers for Disease Control and Prevention [CDC], 2021). Recent research indicates that HPV is responsible for 90% of anal and cervical cancers, 70% of vaginal and vulvar cancers, and 60% of penile cancers (CDC, 2021).

The HPV vaccine is administered prophylactically to reduce the rates of mortality and illness associated with HPV and its related diseases. The World Health Organization (WHO) has endorsed the HPV vaccine as the primary method for preventing cervical cancer, advising its administration before an individual's first sexual contact (Bruni et al., 2016; Markowitz et al., 2012; WHO, 2013). The CDC and the American Society of Gynecology and Obstetrics recommend HPV vaccination for men and women aged 9-26 (Acoglu et al., 2019). Since 2006, many countries, including the USA, Canada, Australia, Germany, France, and Israel, have incorporated the HPV vaccine into their routine vaccination schedules (Bruni et al., 2023b). In Turkey, it is available for a fee and is administered on a voluntary basis.

While the incidence of HPV in Turkey is lower compared to European and North American countries, various risk factors among adolescents and young individuals, such as having multiple sexual partners, early initiation of sexual activity, smoking, and unprotected sex, contribute to an increased likelihood of HPV infection within this demographic (Dag et al., 2023). Despite the established effectiveness of HPV vaccines, a lack of awareness about HPV and its vaccine remains a significant obstacle to the widespread use of vaccines for primary prevention. Several studies indicate that adolescents and young people often lack sufficient knowledge about HPV and its vaccine (Basar et al., 2019; Cetin et al., 2014; Guvenc et al., 2012).

Furthermore, intern nursing students, who are typically young and in their final year of school, are at risk of HPV infection and related complications. They also represent a crucial group that should possess adequate knowledge about HPV infection and vaccines since they are future healthcare professionals. With this perspective in mind, this study aimed to assess the impact of the education provided to intern nursing students on their knowledge and consideration regarding HPV and its vaccine.

Methods

Study Design

A repeated measures design with pretest/posttest measures was used in this study.

Samples/Participants

The study's target population consisted of 94 senior intern nursing students enrolled in the Nursing Department at a state university in the Central Anatolia Region of Turkey. The entire population of these students was initially considered for inclusion. However, six students were subsequently excluded. Two withdrew from the study within the first month following the educational intervention, and four quit in the third month after the program. As a result, the study was conducted with the participation of 88 students, representing a research participation rate of 93.61%. The research did not include students who declined to participate in the study, those who failed to attend at least one educational session, or those engaged in at least one data collection stage.

Instruments

The Personal Information Form. It was developed by the researchers aligned with the existing literature (The Republic

of Turkey Ministry of Health, 2021; Turkish Society of Gynecologic Oncology, 2021; WHO, 2021). It consisted of ten questions related to the socio-demographic characteristics (such as age and gender) and behaviors associated with HPV and the HPV vaccine, including sources of information, vaccination status, and deliberation among the students.

The HPV Information Scale (HPV-IS). It was originally developed by Waller et al. (2013) to assess individuals' knowledge regarding HPV, the HPV vaccine, and screening tests. Demir (2019) conducted the Turkish adaptation of the scale, yielding a Cronbach's α coefficient of 0.96. This scale serves the purpose of investigating whether individuals were previously aware of HPV, the HPV vaccine, and HPV screening tests, as well as assessing the depth of their knowledge of these subjects. Comprising a total of 33 items, the scale is organized into four sub-dimensions: "General HPV Knowledge" (16 items), "HPV Screening Test Knowledge" (6 items), "General HPV Vaccination Knowledge" (5 items), and "Knowledge of Current HPV Vaccination Programs" (6 items). Participants are required to respond to each item with one of three options: 'Yes,' 'No,' or 'I don't know.' In the evaluation process, each correct response receives 1 point, while incorrect answers and 'I don't know' responses are scored as 0 points. In the present study, the Cronbach's α coefficient was calculated as 0.80. Furthermore, the authors of the Turkish version of the HPV-IS were contacted to obtain permission for its use in the study.

Intervention

To evaluate the effectiveness of the education, the HPV-IS, which was applied before the education, was re-administered in the first and third months after the education. The question "Would you like to have an HPV vaccine," which was asked before the education, was asked again in the first and third months after the education.

Pre-test data were gathered by administering the Personal Information Form and the HPV-IS to the intern nursing students who participated in the study just before the educational intervention. Following the pre-test data collection, two groups were formed within two weeks, each consisting of 44 students. The division into groups ensured an equal distribution, considering the classroom capacity for the training and the facilitation of interactive training activities with smaller student numbers. The training sessions were conducted by the same researcher and had no influence on the pre-test data.

The theoretical education was organized into two sessions, held once a week, spanning a total of two weeks. Each training session had a duration of 45 minutes. The educational content was developed by the researchers in accordance with the most recent literature sources (The Republic of Turkey Ministry of Health, 2021; Turkish Society of Gynecologic Oncology, 2021; WHO, 2021). In the first week of theoretical education, topics covered included the definition of HPV, routes of HPV transmission, and the diseases it causes. The second week was focused on information about methods of protection against HPV, the control programs in place, and HPV vaccination.

During the group education sessions, student-centered interactive teaching methods were employed, such as lectures, PowerPoint presentations containing visual and

scientific information, discussions, question-and-answer sessions, and brainstorming. The educational program was conducted in a classroom within the nursing department by the same researcher who led the research. To assess the effectiveness of the education, the HPV-IS, initially administered before the education, was re-administered in the first and third months after the education. Additionally, the question "Would you like to receive an HPV vaccine," posed before the education, was asked again in the first and third months after the education.

Data Collection

The research was conducted at the Faculty of Health Sciences of the university from November 2021 to February 2022. Research instruments were distributed to the students prior to the educational program, as well as at one month and three months following the intervention, and data were gathered through the paper-and-pencil method. The researchers collected the research data within a classroom setting.

Data Analysis

The study's data were processed and analyzed using the IBM SPSS Statistics 20 software package. In this research, the normal distribution of variables was assessed through both visual methods (such as histograms and probability plots) and analytical techniques (including Skewness, Kurtosis, and the Kolmogorov-Smirnov test), confirming their adherence to a normal distribution. Descriptive statistics for the research group were presented regarding numbers and percentage distributions. To investigate the relationship between dependent and independent variables, the researchers employed the Bonferroni correction and conducted one-way repeated measures ANOVA. Effect size calculations in the study were determined using Eta square (η^2) values. Following the guidelines proposed by Cohen (1988), the effect size was characterized as small for $\eta^2 = 0.01$, medium for $\eta^2 = 0.06$, and large for $\eta^2 = 0.14$, each representing approximate values for effect size interpretation.

Ethical Considerations

The study obtained ethical approval from the Scientific Research and Publication Ethics Committee at Cankiri Karatekin University in Turkey (Approval Date: 9.11.2021/No: 23). Participants were duly briefed on the research's aims, duration, and their option to discontinue their involvement until data collection was concluded. They were also guaranteed the confidentiality of the collected data. Following this, their verbal consent was obtained.

Results

The average age of the students was 21.7 ± 0.95 years, with the youngest participant being 20 and the oldest 25 years old. The data revealed that 75% of the students were female, 54.5% had resided in a metropolitan area for an extended period, 73% had received information about HPV, and 72.7% were already familiar with the HPV vaccine. Additionally, 67% of those who had received information about HPV and 55.6% who had acquired knowledge about the HPV vaccine stated that they had obtained this information from their educational institution. While the entire study group had not received the

HPV vaccine, 75% of them expressed their willingness to consider getting vaccinated. Among those who did not contemplate getting the HPV vaccine, the primary reason cited was "I don't know enough about the vaccine" (16.8%) (see Table 1).

Table 1 Sociodemographic characteristics of respondents (N = 88)

Descriptive Characteristics	n	%	Mean (SD)
Age			21.7±0.95
Gender			
Female	66	75	
Male	22	25	
The place lived for a long time			
Metropolis	48	54.5	
Town	32	36.4	
Village/township	8	9.1	
To receive information about HPV			
Yes	73	83	
No	15	17	
HPV information resources			
Education institution	59	67	
Health personnel	1	1.1	
Media	8	9.1	
Family and/or friend	5	5.7	
To receive information about the HPV vaccine			
Yes	64	72.7	
No	24	27.3	
Information resources about the HPV vaccine			
Education institution	49	55.6	
Health personnel	2	2.3	
Media	8	9.1	
Family and/or friend	7	8	
HPV vaccination status			
Yes	0	0.0	
No	88	100	
Consideration of HPV vaccination			
Yes	66	75	
No	22	25	
Reason for not wanting to get HPV vaccine*			
I don't know enough about the vaccine	15	16.8	
I think it is unnecessary	1	1.1	
I don't have a sex life	4	4.5	
I have no contact or contagion	1	1.1	
Because I am male	1	1.1	

*Answers of 22 intern nursing students who do not consider getting the HPV vaccine

Table 2 displays the scores obtained by the study group on the HPV-IS and its sub-dimensions both before the educational intervention and in the first and third months following the intervention. The data in the table reveals that the total scale score was 15.69 ± 4.80 before the intervention, increased to 23.95 ± 2.84 in the first month, and further improved to 24.60 ± 2.70 in the third month after the intervention. A significant difference was observed in the scores of the students concerning the HPV-IS and its sub-dimensions between the pre-intervention phase and the first and third months post-intervention. The Bonferroni test, a multiple comparison analysis, was employed to identify the source of this variance. Significantly higher scores were found for the HPV-IS total score and all four sub-dimensions during the first and third months after the intervention compared to the scores obtained before the intervention ($p < 0.001$).

Regarding the impact of the educational intervention on the HPV-IS total score and sub-dimension scores, it was noted that the effect size in the first month after the training was 0.592, 0.958, 0.132, and 0.758 for the sub-dimensions and

0.682 for the total score, respectively. In the third month following the training, the effect size was determined to be 0.690, 0.342, 0.291, and 0.594 for the sub-dimensions and 0.765 for the total score, respectively.

Table 2 The mean scores of the students from the human papillomavirus knowledge before, one, and three months after the education

Subscales	Before the training	One month after the training	Three months after the training
General HPV Information	8.82±2.62	12.68±1.54	13.12±1.77
HPV screening test information	2.44±1.42	3.86±1.19	3.86±1.19
General HPV vaccine information	3.15±1.32	4.19±0.80	4.20±0.96
Information on the current HPV vaccination program	1.26±1.29	3.21±0.94	3.21±0.94
Total	15.69±4.80	23.95±2.84	24.60±2.70

Moreover, the HPV education provided accounted for 68.8% of the increase in the HPV-IS total score, 59.1% of the increase in the “General HPV Knowledge” score, 34.2% of the increase in the “HPV screening test knowledge” score, 23.4% of the increase in the “General HPV vaccine knowledge” score, and 59.4% of the increase in the “Knowledge of the current HPV vaccination program” (Table 3).

When examining the impact of education on the status of thinking about getting an HPV vaccine, it was determined that while the percentage of those who contemplated getting the vaccine before the education was 75%, this percentage increased to 95% after the education, and the difference was statistically significant ($p < 0.001$) (Table 4).

Table 3 Comparison of the effect of education on HPV-IS total score and sub-dimension scores

Subscales	One month after the training				Three months after the training			
	Mean Square	F ^a	p	Eta Squared	Mean Square	F ^a	p	Eta Squared
General HPV Information	652.960	126.088	<0.001	0.592	811.841	193.954	0.000	0.690
HPV screening test information	5.020.455	1998575	<0.001	0.958	88.778	45.242	0.000	0.342
General HPV vaccine information	21.841	13.181	<0.001	0.132	48.091	35.788	0.000	0.291
Information on the current HPV vaccination program	381.142	273.236	<0.001	0.758	168.091	127.265	0.000	0.594
Total	3.003.006	186.416	<0.001	0.682	3.492.364	282.987	0.000	0.765

^a One-way repeated measures ANOVA

Table 4 The effect of education on consideration of getting the HPV vaccine

	Considering getting the HPV vaccine				Total		Test	p
	Yes		No		n	%		
	n	%	n	%				
Before training	66	75	22	25	88	100	$\chi^2=24.369$	<0.001
One month after the training	84	95	4	4.5	88	100		
Three months after the training	84	95	4	4.5	88	100		

Discussion

This research aimed to assess the impact of educational intervention on the knowledge and consideration of intern nursing students regarding HPV and its vaccine. The results demonstrated that the group education provided to intern nursing students on HPV and its vaccine significantly enhanced their knowledge levels. Furthermore, the study unveiled that while nursing students had a relatively high baseline knowledge of HPV and its vaccine, their knowledge was not consistently accurate or sufficient. A noteworthy finding was that not all of the students had received the HPV vaccine, putting them at risk for HPV-related cancers. Examining the statistics in the summary report on HPV and related diseases, it is noted that in Turkey, cervical cancer caused by HPV ranks as the 5th most common cancer in women aged 15-44 and the 8th leading cause of cancer-related deaths. Additionally, there has been an increase in the incidence of penile cancer attributed to HPV in recent years,

possibly due to increased internal and external migration in Turkey (Bruni et al., 2023a).

In addition, HPV is responsible for approximately 91% of anal cancers, 75% of vaginal cancers, 70% of oropharyngeal cancers, 69% of vulvar cancers, and 63% of penile cancers (Meites et al., 2021). These data emphasize the critical importance of protection against HPV. In this context, primary prevention strategies include eliminating risk factors and administering HPV vaccines. The decreasing age of first sexual activity in Turkey, an increase in the number of sexual partners, and a heightened risk of sexually transmitted diseases among adolescents underscore the necessity of protection to prevent HPV-related diseases.

Given that HPV infections are primarily contracted during adolescence and early adulthood, it is crucial to provide structured and ongoing education to individuals in this age group (Meites et al., 2021). Healthcare professionals are the most reliable source of information that can effectively educate individuals in society, highlighting the importance of regularly

updating the knowledge of healthcare professionals. To achieve this, the initial step involves revising undergraduate curricula and delivering current information through continuous training for existing healthcare personnel. These efforts will significantly enhance public awareness regarding HPV infection and vaccines.

This research was conducted in the Central Anatolian region of Turkey, where the mean age of the intern nursing students was 21.7 years (ranging from 20 to 25), with 75% of the participants being female. When examining the rate of HPV information, it was found that 73% of them had received information about HPV, and 67% of those students had obtained this information within their educational institution. This finding aligns with previous research, which indicated that most nursing students had acquired information about HPV, with their educational institution being the primary source (Basar et al., 2019; Pelullo et al., 2019). However, this contrasts with studies that reported a lack of knowledge about HPV among nursing students (Ebrahim Mahmoud et al., 2021) and a lack of prior awareness of HPV (Sallam et al., 2021).

Regarding knowledge of the HPV vaccine, the study revealed that 72.7% of the intern nursing students had received information about it, and 55.6% of those students had obtained this information from their educational institution. This finding corresponds with previous studies, which found that most nursing students had received information about the HPV vaccine primarily from their educational institution (Basar et al., 2019; Cangol et al., 2019). However, it diverges from studies that reported low rates of information about the HPV vaccine among nursing students (Atitt-Allah et al., 2019; Koramutla et al., 2018). These disparities in results may be attributed to variations in the incidence of HPV-related cancers by country, leading to differences in the awareness of both young people and nursing education institutions. Additionally, inconsistencies in nursing education at international, national, and local levels may contribute to these variations.

Another noteworthy finding from this study is that not all intern nursing students had received the HPV vaccine. This observation aligns with the results of a study by Magdy Elsayed et al. (2022) that indicated not all nursing students in Egypt had been vaccinated against HPV. Similarly, Donmez et al. (2019) reported that 97.2% of nursing students in Turkey had not been vaccinated for HPV, and Koç (2015) found that 99.7% of Turkish nursing students had not received the HPV vaccine. In contrast, Park (2016) determined that 56.8% of female nursing students at a South Korean university had received the HPV vaccine, while Berenson et al. (2021) found that 75.8% of nursing students at a university in the USA had been vaccinated against HPV. In a study conducted by Schmotzer and Reding (2013), which included a sample primarily comprising female students from the nursing department of a university in New Mexico, 28.9% of the students had been vaccinated.

These variations in study outcomes may be attributed to whether the HPV vaccine is integrated into the national vaccination programs of different countries. While the HPV vaccine is part of national vaccination programs in numerous developed and developing nations, it is not included in the national vaccination program in certain countries like Egypt, Ukraine, Serbia, and Turkey (Bruni et al., 2023a). This situation compels young individuals who wish to get

vaccinated to bear the high costs of vaccines themselves, as outlined in the (Turkish Drug Guideline, 2022). One of the primary preventive measures against HPV-related cancers is administering HPV vaccines to adolescents and young people aged 9-26 (Meites et al., 2021). Integrating the HPV vaccine into the national vaccination program, offering free access to young individuals, will bolster their protection against HPV-related cancers and promote their overall well-being as active members of society.

In this study, 16.8% of intern nursing students who were not planning to receive the HPV vaccine cited inadequate knowledge about the vaccine as their primary reason. This finding aligns with a study conducted by Ganju et al. (2017) among nursing students in India, where 48.3% expressed insufficient knowledge as their primary deterrent. Similarly, in a study by Koç (2015) involving Turkish university students, including nursing students, 37.5% of the participants cited lack of adequate knowledge as the foremost reason for not getting vaccinated. In contrast, Sallam et al. (2021) found that the most common reason among 68.7% of nursing, medicine, pharmacy, and dentistry students who chose not to be vaccinated was the perception of a low risk for contracting HPV infection. Altintas et al. (2022) reported that 38.4% of nursing and physiotherapy students who had no intention of getting vaccinated believed the vaccine was harmful, which emerged as the most prevalent reason for vaccine avoidance.

This study revealed the imperative need for university students to receive comprehensive information about the HPV vaccine. It emphasizes the importance of educational interventions aimed at increasing awareness among nursing students about HPV and its vaccine, even within health-related programs, as students often have inaccurate or insufficient knowledge regarding the subject (Dag et al., 2023; Ibrahim et al., 2019; Villanueva et al., 2019). Educational interventions can contribute to raising awareness among young individuals regarding their susceptibility to HPV-related cancers, consequently leading to higher HPV vaccination rates.

Analysis of the total and sub-dimension scores of intern nursing students from the HPV information scale revealed that the scores obtained in the first and third months after the education were significantly higher than those obtained before the intervention. The education administered had a substantial impact on the overall score from the HPV information scale and each sub-dimension score. No studies investigating the impact of the education provided to intern nursing students on their knowledge and consideration toward HPV and its vaccine have been identified. Moreover, research on nursing students in this regard is limited. Ebrahim Mahmoud et al. (2021) evaluated the effects of education based on a Health Belief Model provided to female nursing students. Their quasi-experimental study showed that immediately after the education and four weeks later, the students' knowledge and attitudes were significantly improved compared to the pre-education period, in alignment with the findings of this study.

This study's finding that educational intervention increased nursing students' knowledge about HPV and its vaccine is also consistent with a semi-experimental study conducted by Torabizadeh et al. (2020), which assessed the effects of education on HPV and its vaccine among nursing students. The results indicated a significant increase in students' knowledge, general attitude, and perceived behavior

regarding HPV and its vaccine after the educational intervention. Similarly, Berenson et al. (2021) demonstrated that educational interventions significantly enhanced nursing students' knowledge and preparedness for counseling on the HPV vaccine. Notably, the education provided within the scope of this research not only increased students' knowledge of HPV and its vaccine but also significantly raised the proportion of students considering HPV vaccination. Before the education, 75% of students were willing to consider vaccination, which surged to 95% after the educational intervention. Insufficient knowledge about HPV and its vaccine can place nursing students at risk of HPV-related cancers and result in deficiencies in the preventive health services they can offer to the population they will serve.

Hence, it is crucial to enhance nursing students' knowledge of HPV and its vaccine and implement educational programs that boost their awareness of these topics in nursing education. Increasing nursing students' understanding of this subject holds significance not only for safeguarding their own health but also for disseminating the knowledge they acquire to the individuals in the population they will serve, thereby contributing to the prevention of HPV-related cancers.

However, this study has limitations, such as the absence of a control group, which suggests the need for planning experimental research designs with experimental and control groups for future studies.

Conclusion

The study demonstrated that education provided to intern nursing students about HPV and its vaccine significantly increased their knowledge and the likelihood of considering HPV vaccination. It is crucial to take proactive measures or detect HPV-related cancers early. Given that young people are particularly at risk for HPV infection and related complications, they should be well-informed about HPV and its vaccine. The university years provide an excellent opportunity to develop and implement interventions that equip young individuals with accurate and sufficient information about HPV and its vaccine, facilitating their transition into adulthood. These interventions can not only protect the health of young people but also enable them to transfer their knowledge to the broader population, thereby preventing HPV-related cancers. Therefore, regular and well-planned educational programs to prevent HPV-related cancers are recommended. This study demonstrates that undergraduate nursing students, particularly senior students, lack adequate knowledge about HPV and its vaccine and that these knowledge gaps can be addressed through structured training.

Declaration of Conflicting Interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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Authors' Contributions

SA: Conceptualization, Methodology, Investigation, Resources, Writing- Original draft preparation, Writing- Reviewing and Editing. İG: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing- Original draft preparation, Writing- Reviewing and Editing. All authors were accountable for each step of the study and approved the final version of the article to be published.

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Data Availability

Due to the sensitive nature of the questions asked in this study, all participants were assured raw data would remain confidential and would not be shared.

Declaration of Use of AI in Scientific Writing

Nothing to disclose.

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