Knowledge is Power? Pap Testing Habits of Female OB/GYNs Compared To Other Female Physicians

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Abstract

Background. To investigate whether knowledge regarding cervical cancer risk factors and Pap testing influence OB/GYN physicians' compliance to cervical cancer screening and prevention.

Methods. Female physicians working in the Tel Aviv Sourasky Medical Center were asked to complete an anonymous questionnaire assessing their knowledge of cervical cancer related factors, Pap testing and compliance with screening guidelines. Reported data was compared between resident and senior OB/GYN physicians and physicians from non-OB/GYN specialties.

Results. 42 female OB/GYNs (residents – 18, seniors- 24) and 80 female physicians of other specialties ("non-OB/GYNs", residents -48, seniors -32) volunteered to participate in our study, with similar proportions of resident and senior participants between the two groups ($p=0.0865$). Generally, OB/GYNs were more knowledgeable about cervical cancer prevention and risk factors compared to non-OB/GYNs. OB/GYN residents knew less about world health organization (WHO) recommendations for age at last Pap compared to senior OB/GYNs (answered correctly – 50% vs. 83%, respectively, $p=0.04$). They also knew less about the upper age for vaccine administration (answered correctly – 11% vs 50%, respectively, $p=0.01$). Even so, the majority of physician recommended Human Papillomavirus vaccination, in all groups compared. A similar proportion of OB/GYNs and non-OB/GYNs had performed a Pap smear in the last 3 years (OB/GYN – 75% non-OB/GYN – 83%, $p=0.3$). Of note, a higher percentage of residents, both OB/GYNs and non-OB/GYNs were vaccinated against Human Papillomavirus compared to their senior counterparts (OB/GYNs -38.89% vs. 4.17%, $p=0.013$, non-OB/GYNs 50% vs. 12.5%, $p=0.0007$). Only half of OB/GYNs (residents – 50%, seniors – 66.67%, $p>0.99$) initiated their Pap testing, similar to non-OB/GYNs. Human Papillomavirus vaccination was more prevalent among residents than among seniors, regardless of their specialty (OB/GYNs – 38.89% vs. 4.17%, $p=0.013$, non OB/GYN – 50% vs. 12.5%, $p=0.0007$) with a trend toward higher proportions of vaccinated physicians in non-OB/GYNs.

Conclusion. Female OB/GYNs' knowledge of the importance of Pap test and their accessibility to Pap smear services, do not improve their compliance for Pap smear performance or Human Papillomavirus vaccination. Residents tend to have better general personal health habits out of their field of specialty.

Introduction

Cancer of the uterine cervix is the fourth most common cancer in women worldwide,¹ accounting for an estimated 570,000 new cancer cases and 311,000 deaths in 2018 alone.² Almost 90% of all cervical cancers (CC) as well as CC deaths occur in lower-resource countries, where it remains the leading cause of cancer death in women.²

According to the world health organization (WHO), in 2018, invasive CC incidence and mortality rates in Israel were among the lowest in OECD (Organization for Economic Co-operation and Development) countries, ranked 33 and 19 out of 36 countries, respectively. Data from the Israeli National Cancer Registry (INCR), show that the mean age at diagnosis of invasive CC in Israel is 54 in Jewish women and 50 in non-Jewish women.³ Age-adjusted invasive CC incidence rates have been stable over the past 30 years, with 5-6 cases per 100,000 population per year and mortality rates have also been stable over the past 3 decades with age-adjusted rates of 1-2.35 per 100,000 in the year 2015.³

Infection with Human Papillomavirus (HPV), the leading pathogen causing the disease, can be identified in 99.7% of invasive CC cases.⁴ Known risk factors include early onset of sexual activity, multiple sexual partners, prior history of sexually transmitted diseases (STD), immune suppression, smoking and a low socioeconomic status. Early age at first birth (younger than 20 years old) and increasing parity (three or more full-term births) are additional risk factors for developing CC.⁵

Screening methods in use include the Papanicolaou (Pap) smear and human Papillomavirus (HPV) typing alone or in combination.⁶ Pap smear has been in use since the 1950's, leading to increased early detection rates and a dramatic decrease in mortality rates in countries where it was implemented. According to a systematic review Pap testing has a sensitivity of 30%-87% and a specificity of 86%-100% in detecting CC and its preceding premalignant lesions.⁷ The Israeli Society of Obstetrics and Gynecology (based on the Israeli Society of Colposcopy and Cervical and Vulvar Pathology recommendations) position Paper recommends screening for CC prevention be performed in all women using Pap smear or high-risk HPV stains (HR-HPV) testing. Both tests should be performed starting at age 25, every three years (Pap) or every three to five years (HR-HPV testing). At age 65, if the last three tests were normal, screening can be stopped. Positive result in a HR-HPV screening test (presence of HR-HPV stains) indicates subsequent Pap testing.⁸

CC screening in Israel is accessible and funded but not obligatory and the need for a national screening program for CC is in debate.⁹⁻¹¹ As of now, it is up to the treating physicians to raise awareness and encourage their patients to comply with Pap screening recommendations.

The first HPV vaccine was approved by the FDA (the American Food and Drug Administration) in 2006. Available vaccines protect against two, four or nine HPV types and they all include vaccination against HPV-16 and HPV-18, the most prevalent high-risk types detected in CC specimens.¹² The WHO recommends HPV vaccines as part of routine vaccinations in all countries, along with other preventive measures.¹³ While the vaccines efficiency is very high, it does not eliminate the risk of CC and screening is still required. HPV vaccination has been part of the governmental immunization program in Israel since 2013 and is routinely administered to girls in 8th grade (since 2016 it is also routinely administered to boys at the same age). According to Israeli ministry of health's guidelines, it can also be administered per the manufacturers' registered indications for individuals between 9-25 yr. who were not vaccinated as part of the program and in certain incidences can also be administered up to the age of 45.¹⁴

Several studies have questioned the intuitive correlation between knowledge and Pap testing performance among heterogeneous groups of healthcare providers. In all of these studies, the majority of respondents were nurses and midwives with only a small percentage of physicians.¹⁵⁻¹⁸ Surprisingly or not,

they all found low rates of test execution ^{16,17} with the most common explanation given for the low performance rate being “forgetfulness and neglect”.

The training and knowledge of physicians differ significantly from that of other medical professionals. In addition, it is the OB/GYN's responsibility to schedule and perform Pap smears. These reasons led us to focus our study on physicians alone. Interviewing female OB/GYN physicians and physicians of other specialties (“non-OB/GYNs”) we aimed to evaluate their knowledge regarding CC, assuming that it will influence OB/GYN physicians' compliance with CC screening and prevention.

Materials And Methods

The study was approved by the institutional review board (IRB) at the Tel Aviv Sourasky Medical Center. Informed consent was waived by our IRB due to the anonymous nature of the questionnaires.

We approached OB/GYN and non-OB/GYN female physicians at all levels of seniority who worked at the Tel Aviv Sourasky Medical center during the period of February 2018 to February 2020 in request to answer an anonymous 2-part -questionnaire. Out of 45 OB/GYN and 130 non-OB/GYN approached, 42 and 80 agreed to participate, respectively (overall response rate 69.7%, OB/GYN- 93.33%, non-OB/GYN – 61.53%). The vast majority of the questionnaires were delivered to the different hospital wards where they were distributed to the female physicians while a small fraction of them were delivered via electronic mail.

Questionnaires

The first part of the questionnaire included 27 questions regarding personal data. (Supplementary file 1). The second part of the questionnaire included 12 knowledge questions regarding CC risk factors, Pap test and HPV testing. (Supplementary file 2).

Risk factor awareness index

As part of the knowledge assessment (Supplementary file 2, question 12) participants were asked to identify relevant risk factors for CC out of 7 options given. Each correct identification (either identifying a relevant risk factor as “TRUE” or not - identifying a false risk factor as “TRUE”) granted the questioned physician one point for a maximum of 7 points. The sum of points comprised the individual physician's “Risk factor awareness index”

Statistical analysis

We anticipated a 25% difference in knowledge regarding Pap screening guidelines between OB/GYNs and non-OB/GYNs. Thus, a total of 120 participants in a 1:2 ratio was recruited in order to obtain a power of 80% at a significance level of $p < 0.05$ (2-sided test). Statistical analysis was performed with the use of the SPSS statistic software (version 22; IBM[®] Corporation, NY, USA) and GraphPad Prism (version 8.4.3; GraphPad software, CA, USA). Distribution of variables was evaluated using histograms and Q-Q plots. Kruskal- Wallis test with Dunn's multiple comparisons test were used to compare non-parametric continuous variables. Fishers' exact test was used to compare categorical variables. All statistical analyses were 2 sided and $p < 0.05$ was considered statistically significant. Results are presented as mean and standard deviation (SD).

Results

Overall, 122 female physicians completed the questionnaire: 42 OB/GYN physicians (residents – 18, attending physicians- 24) and 80 non-OB/GYN physicians (“non-OB/GYNs”, residents -48, attending physicians -32). The two groups comprised of similar proportions of resident and senior participants ($p = 0.0865$). Professional characteristics of the study cohort are presented in Table 1, distribution of the study cohort according to specialty and seniority is presented in figure 1.

There were no significant differences in the demographic characteristics and professional experience between the two groups as presented in Table 1. There were no significant differences in the prevalence of most known risk factors for CC as well: 9.52% of the OB/GYNs were smoking vs. 16.25% of non-OB/GYNs ($p = 0.41$), 95.24% of the OB/GYNs were sexually active vs. 90% of the non-OB/GYN ($p = 0.49$) and the average age at initiation of sexual activity was 19.4 ± 3.3 in the OB/GYNs group vs. 19.01 ± 2.52 in the non-OBGYNs group ($p > 0.99$). All the above mentioned remained non-significant when participants were stratified based on seniority, as shown in Table 1. It is noteworthy that condom use was less prevalent in OB/GYN attending physicians compared to OB/GYN residents (0% vs 27.78%, $p = 0.01$) and compared to non-OB/GYNs attending physicians (0% vs. 34.38%, $p = 0.0013$), despite similar proportions of married and sexually active individuals in these groups (Table 1). The age at the performance of first Pap was younger in the non-OB/GYNs group (22.96 ± 4.56 years vs. 26.03 ± 4.57 years, $p = 0.023$) and significantly less OB/GYNs were in compliance with the recommendations of the Israeli Society of Obstetrics and Gynecology for first Pap testing at the age of 25 (48.38% vs. 75%, $p = 0.01$) 19 probably due to a trend in OB/GYN attending physicians (OB/GYN attending physicians - 33% non-OB/GYN attending physicians – 62.96%, $p = 0.07$). Of note, this difference cannot be attributed to professional differences since the participants were still during their basic medical education at the time.

Table 1
Demographic characteristics and professional experience of the study cohort.

	OB-R	OB-AP	OB-A	NOB-R	NOB-AP	NOB-A	OB-A vs. NOB-A (p value)	OB-R vs. OB-AP (p value)	NOB-R vs. NOB-AP (p value)	OB-R vs. NOB-R (p value)
Age (yrs., mean±SD)	34.5±3.45	44.47±7.6	40.09±7.87	33.29±3.11	44.54±7.53	37.76±7.71	0.605	0.0005***	<0.0001****	>0.99
Married (N, %)	12 (66.67)	21 (87.5)	33 (78.57)	33 (68.75)	26 (81.25)	59 (73.75)	0.66	0.139	0.3	>0.99
Yes	6 (33.33)	3 (12.5)	9 (21.43)	15 (31.25)	6 (18.75)	21 (26.25)				
No										
Smoking (N, %)	2 (11.11)	2 (8.33)	4 (9.52)	7 (14.58)	6 (18.75)	13 (16.25)	0.413	>0.999	0.758	>0.99
Yes	16 (88.89)	22 (91.67)	38 (90.48)	41 (85.42)	26 (81.25)	67 (83.75)				
No										
Sexually active (N, %)	18 (100)	22 (91.67)	40 (95.24)	45 (93.75)	27 (84.38)	72 (90)	0.49	0.498	0.255	0.556
Yes	0 (0)	2 (8.33)	2 (4.76)	3 (6.25)	5 (15.63)	8 (10)				
No										
Age at first sexual activity (yrs., mean ±SD)	19.44±3.95	19.45±2.75	19.45±3.3	19.06±2.61	18.93±2.33	19.01±2.52	>0.999	>0.99	>0.99	>0.999
Condom use (N, %)	5 (27.78)	0 (0)	5 (11.9)	18 (37.5)	11 (34.38)	29 (36.25)	0.0053**	0.01*	0.816	0.568
Yes	13 (72.22)	24 (100)	37 (88.1)	30 (62.5)	21 (65.63)	51 (63.75)				
No										
Education (yrs., mean ±SD)	20.11±1.76	19.74±1.63	19.9±1.67	19.2±2.11	19.08±3.91	19.16±2.88	0.329	>0.99	>0.99	0.854
Professional experience (yrs., mean±SD)	2.63±1.62	10.52±7.86	6.93±7.06	2.58±1.67	11.53±8.46	6.43±7.27	>0.999	0.0077**	<0.0001****	>0.999
Age at first Pap (yrs., mean±SD)	24.77±3.46	26.94±5.12	26.03±4.57	21.83±3.59	24.51±5.17	22.96±4.56	0.0239*	>0.999	0.40	0.400
<25 yrs. (N, %)	9 (69.23)	6 (33)	15 (48.39)	31 (83.78)	17 (62.96%)	48 (75)	0.019*	0.073	0.08	0.42
>25 yrs. (N, %)	4 (30.77)	12 (66.67)	16 (51.61)	6 (16.22)	10 (37.04%)	16 (25)				

OB-R – OB/GYN residents. OB-AP – OB/GYN attending physicians. NOB-R – non-OB/GYN residents. NOB-AP – non-OB/GYN attending physicians. OB-A – OB/GYN all. NOB-A – non-OBGYN all. Pap – Papanicolaou. yrs. – years (of age). SD- Standard deviation. *- p<0.05. **- p<0.01. *** -p<0.001. **** p<0.0001

Table 2 summarizes the differences in general knowledge regarding CC and Pap testing between the groups. A significantly higher proportion of OB/GYNs answered correctly each of the 6 questions asked (question 1 - p=0.0006 questions 2, 4-6 - P<0.001, question 10 -P=0.0018, Supplementary file 2). Notably, less OB/GYN residents knew about the Israeli Society of Obstetrics and Gynecology's recommendations for upper age limit for Pap testing (50% vs. 83%, P=0.04) and for upper age limit for vaccination (11% vs 50%, p=0.01). Even so, when asked whether they would recommend HPV vaccination to their patients, the majority of physicians, both OB/GYNs and non-OB/GYNs and in all levels of seniority, answered positively (OB/GYNs – 93%, non-OB/GYNs 86%, p=0.37). Physicians in the OB/GYNs group also demonstrated greater knowledge regarding risk factors for CC as seen by significantly higher calculated risk factor awareness indices (5.78 vs 4.48, p<0.001), with no difference between residents and attending physicians (Table 2).

Table 2
Knowledge of Pap testing and HPV vaccination among OB/GYN and non-OB/GYN female physicians.

	OB-R	OB-AP	OB-A	NOB-R	NOB-AP	NOB-A	OB-A vs. NOB-A (p value)	OB-R vs. OB- AP (p value)	NOB- R vs. NOB- AP (p value)	OB-R vs. NOB-R (p value)	OB-AP vs. NOB-AP (p value)
Goal of Pap smear (N, %)	18 (100)	24 (100)	42 (100)	38 (79)	24 (77)	62 (77)	0.0006***	>0.99	>0.99	0.051	0.014*
Right answer	0 (0)	0 (0)	0 (0)	10 (21)	7 (23)	17 (23)					
Wrong answer											
Recommended Pap frequency (N, %)	16 (89)	21 (87)	37 (88)	18 (38)	10 (32)	28 (35)	<0.0001****	>0.99	0.81	0.0002***	<0.0001**
Right answer	2 (11)	3 (13)	5 (12)	30 (62)	21 (68)	51 (65)					
Wrong answer											
Recommended age first Pap (N, %)	11 (61)	19 (79)	30 (71)	6 (12)	4 (13)	10 (12)	<0.0001****	0.302	>0.99	0.0002***	<0.0001**
Right answer	7 (39)	5 (21)	12 (29)	42 (88)	27 (87)	69 (88)					
Wrong answer											
Recommended age last Pap (N, %)	9 (50)	20 (83)	29 (69)	5 (10)	3 (10)	8 (10)	<0.0001****	0.04*	>0.99	0.0012**	<0.0001**
Right answer	9 (50)	4 (17)	13 (31)	43 (90)	28 (90)	71 (90)					
Wrong answer											
Aware of vaccine type (N, %)	12 (67)	17 (71)	29 (69)	13 (27)	9 (29)	22 (28)	<0.0001****	>0.99	>0.99	0.0046**	0.0029**
Right answer	6 (33)	7 (29)	13 (31)	35 (73)	22 (71)	57 (72)					
Wrong answer											
Upper age of vaccine (N, %)	2 (11)	12 (50)	14 (33)	3 (6)	4 (13)	7 (9)	0.0018**	0.01*	0.423	0.608	0.006**
Right answer	16 (89)	12 (50)	28 (67)	45 (94)	27 (87)	72 (91)					
Wrong answer											
Recommends vaccination (N, %)	16 (89)	23 (96)	39 (93)	44 (92)	24 (77)	68 (86)	0.374	0.567	0.099	0.66	0.119
1 Yes	2 (11)	1 (4)	3 (7)	4 (8)	7 (23)	11 (14)					
2 No											
Risk factor awareness index (out of 7±SD)	5.55±1.15	5.95±0.8	5.78±0.97	4.43±1.08	4.56±0.95	4.48±1.03	<0.0001****	>0.99	>0.99	0.006**	<0.0001**
OB-R – OB/GYN residents. OB-AP – OB/GYN attending physicians. NOB-R – non-OB/GYN residents. NOB-AP – non-OB/GYN attending physicians. OB-A – OB/GYN all. NOB-A – non-OB/GYN all. Pap – Papanicolaou. HPV – Human Papillomavirus. SD- Standard deviation. *- p<0.05. **- p<0.01. *** -p<0.001. **** p<0.0001											

Data regarding Pap performance status is presented in Table 3. In average, longer time has passed since the last Pap smear in the OB/GYNs group compared with the non-OB/GYNs group (3.305 years vs 2.26 years, respectively, p=0.0099) but a similar proportion of physicians had performed a Pap smear in the last 3 years (OB/GYN – 75% non-OB/GYN – 83%, p=0.3). Of note, a higher percentage of residents, both OB/GYNs and non-OB/GYNs were vaccinated against HPV compared to their senior counterparts (OB/GYNs -38.89% vs. 4.76%, p=0.0149, non-OB/GYNs 51.06% vs. 15.38%, p=0.0028). Excluded from these calculations were 3 OB/GYN attending physicians, 1 non-OB/GYN resident and 6 non-OB/GYN attending physicians who were older than 45 yr. at the time HPV vaccination was available in Israel. About half of the unvaccinated physicians agreed to reveal their motives. Interestingly, 60% of OB/GYN resident and attending physicians as well as of non-OB/GYN attending physicians did not vaccinate because they had a regular sex partner. The remaining 40% did not vaccinate because of their age. Out of the unvaccinated non-OB/GYN attending physicians who revealed their motives, 16.66% justified their choice in having a regular

sex partner and 83.34% stated their reason was age related. Only half of OB/GYNs (residents – 50%, attending physicians – 66.67%, $p=0.348$) initiated their own Pap testing, similar to non-OB/GYNs. Among non-OB/GYNs, residents showed a higher initiative towards undergoing Pap test compared to attending physicians, although not significant (47.92% vs 37.5%, $p=0.49$). Overall, OBGYNs tend to initiate the test more than non – OBGYNs although also not significant (59.52% vs 43.75%, $p=0.127$).

Table 3
Pap testing and HPV vaccination compliance in OB/GYN and non-OB/GYN female physicians.

	OB-R	OB-AP	OB-A	NOB-R	NOB-AP	NOB-A	OB-A vs. NOB-A (p value)	OB-R vs. OB-AP (p value)	NOB-R vs. NOB-AP (p value)	OB-R vs. NOB-R (p value)
Time from last Pap (yrs., mean±SD)	3.625±3.217 13 (81.25) 3 (18.75)	3.05±1.385 14 (70) 6 (30)	3.305±2.358 27 (75) 9 (25)	2.2073±1.588 35 (85.37) 6 (14.63)	2.351±2.02 22 (81.48) 5 (18.52)	2.264±1.79 57 (83.82) 11 (16.18)	0.0099** 0.3	>0.99 0.7	>0.99 0.742	0.31 0.7
<3 years (N, %)										
>3 years (N, %)										
Time between last Pap and previous one (yrs., mean±SD)	3.687±3.177	3±1.414	3.305±2.352	2.5±1.325	3.41±4.125	2.904±2.980	0.691	>0.99	>0.99	>0.99
Pap initiator Patient (N, %)	9 (50) 9 (50)	16 (66.67) 8 (33.33)	25 (59.52) 17 (40.48)	23 (47.92) 25 (52.08)	12 (37.5) 20 (62.5)	35 (43.75) 45 (56.25)	0.127	0.348	0.49	>0.99
Physician (N, %)										
HPV vaccination status ^	7 (38.89) 11 (61.11)	1 (4.76) 20 (95.24)	8 (20.51) 31 (79.49)	24 (51.06) 23 (48.94)	4 (15.38) 22 (84.62)	28 (38.36) 45 (61.64)	0.059	0.0149*	0.0028**	0.418
Positive (N, %)										
Negative (N, %)										

^ Excluding cases over vaccination age limit.

OB-R – OB/GYN residents. OB-S – OB/GYN attending physicians. NOB-R – non-OB/GYN residents. NOB-AP – non-OB/GYN attending physicians. OB-A – OB/GYN all. NOB-A – non-OBGYN all. Pap – Papanicolaou. HPV - Human Papillomavirus. yrs. – years (of age). SD- Standard deviation. *- $p<0.05$. **- $p<0.01$. ***- $p<0.001$. **** $p<0.0001$

Discussion

Main Findings

One hundred and twenty-two female physicians (42 OB/GYNs, 80 non-OB/GYNs) accepted our request to complete a two-part questionnaire regarding their knowledge on CC and Pap testing as well as their compliance with the test. Our results showed that OB/GYNs had greater knowledge about CC and the importance of Pap test (as expected) compared to non-OB/GYNs. For the most part, residents and attending physicians in the two groups were equally educated to the extent covered in the study questionnaire. Less OB/GYN residents knew about the Israeli Society of Obstetrics and Gynecology's recommendations for upper age limit for Pap testing and about the upper age limit for vaccination compares to OB/GYN attending physicians, possibly due to the fact that residents do not perform out-patient clinics and routine gynecological examinations during their residency. We are currently implementing a periodic briefing of Pap smear and HPV vaccination guidelines into the resident's curriculum to increase awareness and knowledge from the earliest stages of residency. Despite their broader knowledge, OB/GYNs did not initiate CC screening more than non-OB/GYNs nor did they comply more with the recommended timeframe for Pap testing (once every 3 years). Regardless of their knowledge, all four compared groups highly recommended HPV vaccine. Surprisingly, significantly more residents were vaccinated against HPV compared to their senior counterparts. Somewhat similar results were recently published by Soyler et al., who conducted a study evaluating the knowledge, attitude, and practice regarding cancer screening tests among health workers in a university hospital in Turkey. The authors reported that although 50.3% of the health workers demonstrated correct knowledge of the timing of Pap smear and 94.85%

demonstrated positive attitude toward the test, only 4.2% of them practiced it. Contrary to our results, Soygar et al. found that as the age and years of experience of the workers increased, they were more likely to undergo screening tests. Of note, only 17.7% of the study population were physicians and all of them were residents.¹⁵

Additional studies have examined the compliance of medical staff to Pap testing. Kabacaoglu et al. questioned 524 female health personnel (18.3% physicians and 81.7% nurses) regarding breast and CC prevention practice and showed that while 26.3% of participants thought about taking an HPV test, only 4.4% actually underwent HPV testing. 19.5% of married participants had a Pap smear conducted regularly. The most important causes for not performing tests for early diagnosis of breast and cervical cancers were "forget and neglect".¹⁶ Can et al. examined the awareness of 327 female health employees (midwives - 43.7%, nurses - 40.4%, physicians - 6.4%, emergency medical technicians and others - 9.5%) working in primary health care services to CC and its risk factors. They reported that a large proportion of the subjects had little knowledge regarding CC and inadequate screening practice.¹⁷ Another study conducted by Oranratanaphan included 78 participants (31.8% nurses, 43.9% nurse aids and 24.2% "others") and showed that while their knowledge about the importance of the Pap smear, early detection and the treatment of early-stage CC was adequate, the participants' awareness of CC risk factors was relatively low. The main reasons for avoiding Pap smear screening were fear of vaginal examination (27.6%), embarrassment (26.3%), lack of any symptoms (22.4%) and being busy (17%).¹⁸

Practicing medicine is a highly stressful job. Stress has been shown to be associated with less practice of health promoting behaviors. Tucker et al surveyed 2247 staff nurses working in a large medical center in the US and showed that perceived stress levels were negatively associated with overall health-promoting behavior indices.²⁰ Furthermore, in 2016, a cross-sectional study of over 30,000 female nurses working in 100 hospitals across Taiwan demonstrated that nurses were less likely to have Pap smear screening than the general population. Amazingly, each point increase in stress index decreased the likelihood of Pap smears.²¹

Doctors are notoriously known for being the worst patients. Haran *et al.* reported extremely low compliance of physicians and nurses in administering iron supplements for their own children. Nurses were significantly more compliant compared to physicians. The degree of seniority also affected compliance - specialists were significantly less compliant compared to interns and certified nurses were also less compliant compared to uncertified nurses.²² This was also the case for HPV vaccination in our study group but not for Pap testing initiative. Including only physicians who were eligible for vaccination, the proportion of OB/GYNs who were vaccinated did not differ significantly from non-OB/GYNs (20.51% vs. 38.36%, $p=0.059$). Only 1 OB/GYN attending physician was vaccinated out of 24 OB/GYN attending physicians who were eligible. 90% of unvaccinated OB/GYN attending physicians revealed their rationale for not vaccinating (60% - "regular sexual partner" 40% - "age") implying that when it comes to personal health habits, physicians tend to follow misbeliefs rather than evidence-based medicine.

Strengths and Limitations

Our study was performed in a large medical center in the Tel-Aviv metropolitan area, which limited the number of participants but enabled a homogenous background of the participants. The questionnaires were anonymous, which assured our subjects' privacy and helped them answer the questions honestly and raised our study's reliability.

Our study has two major limitations. First, participants were included on voluntary basis, potentially subjecting our results to volunteer bias. It is well accepted that volunteers might be less likely to put themselves forward for studies of behaviors that are less socially acceptable and are related to the studied condition or disease.²³ Ensuring anonymization in both delivery and answering of the questioner was implemented to minimize that effect. Our study results are in line with previous, less focused, studies, strengthening the notion that this bias was probably not significant. Second, our participants were inquired about past events, subjecting their answers to recall bias.²⁴ We believe that physicians are specifically attentive to their medical history thus decreasing the chances of recall bias affecting our study results. If any of the biases did affect our study to some extent, both OB/GYNs and non-OB/GYNs were probably equally affected.

Conclusion

Together with our results, it appears that medical knowledge does not necessarily correlate with adequate personal practice when it comes to doctor's personal health promoting behaviors. Our study showed the same trend by demonstrating equal compliance of OB/GYNs with recommended screening test intervals, self-initiation of Pap test and HPV vaccination as non-OB/GYN when intuitively, they are expected to perform better. Physicians in their residency training are probably more updated in other fields of medicine compared to attending physicians, resulting in better general personal health habits out of their field of specialty.

To our knowledge, this is the first study to examine if OB/GYNs "practice what they preach". We showed that female OB/GYN's knowledge of the importance of Pap test and their accessibility to Pap smear services, do not improve their compliance for Pap smear performance or HPV vaccination. We have learned from former and the current study that physician's personal health is also influenced by their workload and schedule. An effort should be made by OB/GYNs and their professional organizations to adhere to Pap testing guidelines and HPV vaccination and set an example for the general population. This could be achieved by creating a framework of annual check-ups, preferably as single-day sessions including several physician encounters and screening for common health problems (eye examination, cardiac function, GYN with Pap smear, pelvic ultrasound and more). By doing so, physicians can take care of their own health despite their busy schedule.

Abbreviations

cervical cancers (CC), Human Papillomavirus (HPV), Papanicolaou (Pap).

Declarations

Details of Ethics Approval: The study was approved by the institutional review board (IRB) at the Tel Aviv Sourasky Medical Center. Approval num. 0796 – 17 – TLV. All methods were performed in accordance with the relevant guidelines and regulations. Questionnaire completion validated an informed consent.

Availability of data and materials: The datasets used and/or analyzed during the current study are not publicly available to protect participants' privacy but are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Contribution to authorship: GH - Study conception and design, data collection, analysis, and interpretation of data, drafting of manuscript. YO - Study conception and design, data collection, analysis and interpretation of data, critical revision. NM - Analysis and interpretation of data. EF - Data collection. DG - Analysis and interpretation of data, critical revision. YR - Study conception and design, analysis and interpretation of data, drafting of manuscript.

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Figures

Figure 1

Specialty and Seniority distribution of the study cohort.

R- residents, S-seniors, ER- emergency room, ICU-intensive care unit.

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