

SHORT PAPER

Factors associated with reporting adverse reactions after immunization, study in a sample of university students

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Parole chiave: Vaccini, vaccinazione, studenti universitari, Sicilia, percezione vaccinazioni

Abstract

Introduction. On the day of a workshop (named “Vaccino Day”) on vaccinations, organized for the students of the University of Palermo by the ERSU (Regional Office for the Right to University Study), the sample of students were given a questionnaire to fill out. The aim of the survey was to investigate the perception of vaccinations on a sample population made up of university students.

Materials and Methods. A self-administered paper questionnaire was given to participants of the workshop. The questionnaire is divided into 3 parts: demographic, economic and habits informations have been asked in the first part; in the second part, they had to answer the question: “What term do you associate with vaccination?”; in the third part, they were posed the question: “Have you ever had any adverse reactions after being vaccinated?”. Therefore, the percentage response frequencies and the statistically significant Odds-Ratio (aOR) are presented with a corresponding 95% confidence interval (CI). Statistical analysis was performed using the STATA® 14 software.

Results. A total of 350 students were asked to participate and the response rate was 100%, the 61.43% of the interviewed population was made up of females. Taking into account the dependent variable: “at least a moderate-severe adverse reaction after a vaccination” the statistically significant independent variables associated are “Have fear of side effects” (aOR 7.06, 95% CI 1.73-28.57, $p=0.006$), “I associate the term “vaccination” to Needles/syringes” (aOR 3.82, 95% CI 1.08-13.48, $p=0.037$), “I associate the term “vaccination” to Protection” (aOR 3.50, 95% CI 1.02-11.98, $p=0.046$).

Discussions and Conclusions. Vaccination is still influenced by emotional factors and lack of campaigns providing adequate information, therefore negative judgement tend to outweigh the real risks and benefits. Considering that the sample was composed of university students, being highly educated and capable of becoming opinion leaders in the future, there is a need to create a more efficient communication protocol that make the student, and then the citizen, better aware of the actual risks associated with vaccinations and their real benefits.

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Introduction

Differently from other drugs, given to sick patients resulting in evident healing, vaccinations are administered to healthy people, who will not ever see that specific disease thanks to the jab. In other words, their efficacy cannot be appreciated. The only results which can be visually assessed are cases of side effects. 82% of Europeans have a positive perception of vaccines and consider them important and necessary (1). Vaccination is recognized as being important in all countries and with a high degree of adherence by citizens: 88% in Switzerland (Ticino), 86% in Germany, 91% in Spain, 81% in Italy, 90% in Great Britain (1, 2). On December 14th, 2016, a vaccination workshop (named “Vaccino Day”) took place in Palermo. During the event organized by the ERSU (Regional Office for the Right to University Study) and the School of Medicine of the University of Palermo, the undergraduate students had the chance to get free jabs against meningitis (A, C, W₁₃₅, Y serotypes) and had to hand in a questionnaire. The aim of the survey was to investigate the perception of vaccinations on a sample population made up of university students.

Materials and Methods

On December 14th, 2016, an anonymous self-administered questionnaire was handed out to 350 students attending the “Vaccine Day” workshop. It was a convenience sample. The questionnaire was created by the authors for this study and consisted of 17 questions, the first part of the survey focused on obtaining from them information on: gender, age, degree (medical field or other), their perceived economic status (medium-high or low), the state of their health (medium-high or low), their drug intake usage patterns, their level of assessment on the information

provided on vaccinations, their sentiment on the possible manifestation of side effects and their view on vaccine effectiveness. In the second part, there were 8 pre-set possible answers to the question: “What term do you associate with vaccination?” (Needles/syringes, Uselessness, Solidarity, Fear, Pharmaceutical business, Fighting illnesses, Protection and Prevention), and students could tick off a “Yes” or “No” to these pre-set answers. In the third part of the questionnaire, the question was: “Have you ever had adverse reactions after being vaccinated? (in generally, for any immunization)” and students could choose out of the following 4 responses: a) none, b) mild (localized skin reaction, low grade fever, headache, tiredness), c) moderate (soreness arm, fever > 38.5° C, seizure caused by fever, temporary low platelet count), d) severe (difficulty breathing, anaphylactic shock).

The answers to the third part were aggregated and dichotomized into: adverse reactions a) none-mild and b) moderate-severe. The statistical significance level chosen for the entire analysis was 0.05. For all the qualitative variables, absolute and relative frequencies were calculated; categorical variables were analysed by Pearson’s Chi-square test (2). The results were analysed using the STATA statistical software version 14 (3). The covariates to be included into the final model were selected using a stepwise forward selection process, with a univariate p-value <0.25 as the main criterion (4). Results are expressed as adjusted Odds Ratio (aOR) with 95% Confidence Intervals (CI).

Results

A total of 350 students were asked to participate and the response rate was 100%, the 61.43% of interviewees were females, the 100% of participants were born in Italy, the 23.62% of the respondents are medical

Table 1 - Characteristics of the students.

		N	(%)
Gender	Female	215	61.43
	Male	135	38.57
Country of birth	Italy	350	100.00
	Other	0	0.00
Degree course*	Medical area	73	23.62
	Other	236	76.38
Adverse reactions reported**	None	260	79.75
	Mild	47	14.42
	Moderate	18	5.52
	Severe	1	0.31

*41 respondents did not provide this data

**24 respondents did not provide this data

students attending a degree course, the mean age was 24.15 (SD \pm 4.46) (Table 1). Overall, the 0.92% of respondents associate the term “vaccination” to the word “Uselessness”, the 1.23% to “Solidarity”, the 2.77% to “Fear”, the 4.92% to “Pharmaceutical business”, the 29.23% to “Fighting illnesses”, the 74.15% to “Prevention”, the 34.46% to “Protection”, the 22.15% to “Needles/syringes”. With regard to the bivariate analysis (Table 2), only statistically significant results are presented in this section, the 7.59% of respondents having a low perceived economic status and the 15% having a low perceived state of health have had at least a moderate-severe adverse reaction after a vaccination, the 13.54% of interviewees reported having fear of side effects and the 33.33% stated that vaccines are not effective having had at least a moderate-severe adverse reaction after a vaccination, the 12.50% of respondents who had associated the term “vaccination” to “Needles/syringes” and the 9.81% to “Protection” have had at least a moderate-severe adverse reaction after a vaccination. Table 3 shows the adjusted Odds Ratios, considers them dependent variables: “at least a moderate-severe adverse reaction after a vaccination” the statistically significant independent variables associated are “Have fear of side

effects” (aOR 7.06, 95% CI 1.73-28.57, $p=0.006$), “I associate the term “vaccination” to Needles/syringes” (aOR 3.82, 95% CI 1.08-13.48, $p=0.037$), “I associate the term “vaccination” to Protection” (aOR 3.50, 95% CI 1.02-11.98, $p=0.046$); each independent variable is adjusted for all the other independent variables in Table 3.

Discussions and Conclusions

It is important not to underestimate the fact that the term vaccination is associated with “Solidarity” by about 3% of students and that at least 1/5 of the sample responses had associated the term with “Needles/syringes” as these are known to be painful and ultimately rejected. There is still a lot of work that needs to be done to improve communication, getting citizens to be better participants, involving them in public health issues. Considering that the sample was composed of university students with a good education level as well as likely future opinion leaders, they appear to have distorted perceptions concerning the risks and benefits associated with vaccines; this may be explained by the media clamour occurring out of recent misjudgements (5), especially with reference to the false connections

Table 2 - Bivariate associations between adverse reactions reported and all questionnaire variables. Used Pearson's Chi-square test.

Variables		Have you ever had adverse reactions after you have been vaccinated?		
		None-mild (%)	Moderate-severe (%)	p-value
Gender	Female	185 (93.43)	13 (6.57)	0.480
	Male	122 (95.31)	6 (4.69)	
Medical students	No	204 (93.58)	14 (6.42)	0.240
	Yes	70 (97.22)	2 (2.78)	
Perceived economic status	Medium-high	98 (98.99)	1 (1.01)	0.017
	Low	207 (92.41)	17 (7.59)	
Perceived health status	Medium-high	272 (95.44)	13 (4.56)	0.008
	Low	34 (85.00)	6 (15.00)	
Do you usually take drugs?	No	251 (94.72)	14 (5.28)	0.311
	Yes	52 (91.23)	5 (8.77)	
Do you think you are sufficiently informed about vaccinations?	No	89 (93.68)	6 (6.32)	0.810
	Yes	218 (94.37)	13 (5.63)	
I'm afraid of the side effects	No	223 (97.38)	6 (2.62)	<0.001
	Yes	83 (86.46)	13 (13.54)	
I think that vaccines are not effective	No	305 (94.43)	18 (5.57)	0.041
	Yes	2 (66.67)	1 (33.33)	
What term do you associate with "vaccination"?				
Needles/syringes	No	243 (96.05)	10 (3.95)	0.006
	Yes	63 (87.50)	9 (12.50)	
Uselessness	No	303 (94.10)	19 (5.90)	0.665
	Yes	3 (100.00)	0 (0.00)	
Solidarity	No	302 (94.08)	19 (5.92)	0.616
	Yes	4 (100.00)	0 (0.00)	
Fear	No	298 (94.30)	18 (5.70)	0.495
	Yes	8 (88.89)	1 (11.11)	
Pharmaceutical business	No	290 (93.85)	19 (6.15)	0.307
	Yes	16 (100.00)	0 (0.00)	
Fighting illnesses	No	213 (92.61)	17 (7.39)	0.065
	Yes	93 (97.89)	2 (2.11)	
Protection	No	205 (96.24)	8 (3.76)	0.027
	Yes	101 (90.18)	11 (9.82)	
Prevention	No	77 (91.67)	7 (8.33)	0.259
	Yes	229 (95.02)	12 (4.98)	

Table 3 - Multivariable logistic regression, stepwise forward selection process with a univariate p-value <0.25 as the main criterion. Adjusted Odds Ratio are presented.

Dependent variable	Independent variables	aOR	95% CI	p-value
At least a moderate-severe adverse reaction after a vaccination	Have fear of side effects	7.02	1.73 - 28.57	0.006
	I associate the term “vaccination” to Needles/syringes	3.82	1.08 - 13.48	0.037
	Perceived economic status: low	7.50	0.83 - 68.00	0.073
	Perceived state of health: low	3.37	0.86 - 13.13	0.080
	I associate the term “vaccination” to Fighting illnesses	0.31	0.05 - 1.78	0.188
	I associate the term “vaccination” to Protection	3.50	1.02 - 11.98	0.046

between vaccination and autism (6). Low perceived economic status and perceived low state of health, associated with a higher likelihood of a moderate-severe adverse reaction, seemed to be more easily manipulable and controllable categories (7), these respondents may have been influenced by the increasing number of web pages reporting “anti-vax” discussions, these words seem to be “playing” on the emotional compliance of people (8); instead, multivariate analysis shows that having at least one moderate to severe adverse reaction after vaccination makes the subject more concerned about their side effects and consequently are much more likely to associate the term “vaccination” with “Needles/syringes”; in antithesis seems to be the result that who having had at least one moderate to severe adverse reaction after vaccination associate the term “vaccination” to “Protection”, the Authors believe that the association is due to the fact that these interviewees have been more effectively educated by the training event about the risks related to the onset of the disease, net of possible adverse effects after the vaccination. the Authors also believe that these respondents were more receptive to the issue given the previous adverse effects after vaccination. As mentioned before, the latter are the cause of such objection to vaccination being a cause of pain. Vaccination is still influenced by emotional factors and inadequate information spread out by campaigns, in fact respondents’ negative

perceptions outweigh the real risks and benefits (9, 10). The study has limits: being a cross-sectional study does not allow the inference on the causal associations between the problems investigated; it’s a convenience sample, therefore is relatively small and not representative size; the adverse reactions are self-reported and not objectively reported. The study results show the great importance of training events for the students such as the “Vaccine Day” workshop; similarly to what was reported among the targets of the “National Vaccination Prevention Plan” (Piano Nazionale Prevenzione Vaccinale in italian) 2017-2019, the “Vaccine Day” workshop increased awareness of vaccination by promoting the active and free offer for the tetravalent anti-meningococcal vaccine (A, C, W₁₃₅, Y serotypes) in a historical moment in which scientific information is hindered by fake news.

Considering that the sample was composed of university students, with a high education level and likelihood of becoming future opinion leaders, it is necessary to create a more efficient communication protocol that makes students, and ultimately citizen, more aware of the actual risks of vaccines and their real benefits.

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Riassunto

Fattori associati alle reazioni avverse dopo la vaccinazione, studio in un campione di studenti universitari

Introduzione. Nell'ambito di un evento ("Vaccino Day") informativo e formativo sulle vaccinazioni organizzato dall'ERSU (Ente Regionale per il diritto allo Studio Universitario di Palermo) per gli studenti dell'Università di Palermo allo scopo di rilevare la percezione riguardo la vaccinazione da parte degli studenti universitari è stato somministrato un questionario per rilevare la stessa.

Materiali e Metodi. È stato somministrato un questionario cartaceo autosomministrato ai partecipanti al workshop. Il questionario è composto da 3 parti: nella prima parte erano richiesti i dati demografici, economici e abitudini; nella seconda parte è stata posta la domanda: "Che termine associ a "vaccinazione"?", nella terza parte è stata posta la domanda: "Hai mai avuto reazioni avverse dopo che sei stato vaccinato?". Sono dunque presentati le frequenze percentuali di risposta e gli Odds-Ratio aggiustati (aOR) statisticamente significativi con relativo intervallo di confidenza (IC) al 95%. Le analisi

statistiche sono state eseguite utilizzando il software STATA® 14.

Risultati. È stato chiesto a un totale di 350 studenti di partecipare e il tasso di risposta è stato del 100%, il 61,43% degli intervistati erano femmine. Considerando come variabile dipendente: "almeno una reazione avversa moderata-grave dopo una vaccinazione" le variabili indipendenti statisticamente significative associate sono "Ho paura degli effetti collaterali" (aOR 7,06, IC 95% 1,73-28,57, p=0,006), "Associo il termine "vaccinazione" a Aghi/siringhe" (aOR 3,82, IC 95% 1,08-13,48, p=0,037), "Associo il termine "vaccinazione" a Protezione" (aOR 3,50, IC 95% 1,02-11,98, p=0,046).

Discussioni e conclusioni. La vaccinazione è ancora molto influenzata da fattori emozionali e da una inadeguata campagna informativa, che favoriscono la percezione negativa dei reali rischi e benefici. Considerando che il campione era composto da studenti universitari, con un buon grado di istruzione e probabili futuri *opinion leader* del Paese, si rende necessaria la creazione di un protocollo comunicativo più efficace che renda lo studente, e quindi il cittadino, più consapevole dell'effettivo rischio della vaccinazione e dei reali benefici tratti da questa.

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