

# Knowledge, attitudes and behaviour about Sexually Transmitted Infections: a survey among Italian university female students

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## ABSTRACT

**BACKGROUND:** Improvements have been made in terms of STIs mortality, but young women still have a lack of attention to the STIs prevention.

We investigated the knowledge and attitudes about STIs and their prevention among a sample of Italian university female students.

**METHODS:** We designed a questionnaire about knowledge and attitudes toward STIs, Papanicolaou test (Pap test) and Human Papilloma Virus (HPV) and had it filled out by 285 women aged 18-25 years. Chi-square test, Mann-Whitney test and a multivariable analysis were performed in order to identify associated factors.

**RESULTS:** Knowledge about STIs seems weak, oppositely to knowledge about preventive measures. In line with the results of the univariate analyses, the multivariable one confirmed a higher probability to answer rightly for women who knew the effective behaviours for preventing STIs, women who took information about STIs from Internet, books and TV and those using natural methods (OR 2.77 - 95%CI 1.47-5.23, OR 2.99 - 95%CI 1.62-5.53 and OR 2.55 - 95%CI 1.05-6.18, respectively) and a lower one for students from Cassino and those who knew is possible to recover from STIs (OR 0.38, 95%CI 0.17-0.87 and 0.42, 95%CI 0.20-0.88, respectively). Furthermore, about Pap test it also confirmed the role of a medium-high STIs level of knowledge (OR 2.11, 95%CI 1.02-4.37) and a lower probability to know about it for women from Cassino (OR 0.25, 95%CI 0.09-0.73).

**CONCLUSION:** Young women are not completely aware of STIs risks and preventive measures. Informational and educational campaigns should be implemented to reach this target group and lighten the current and future burden of STIs.

*Key words:* sexually transmitted infections, knowledge, prevention

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## INTRODUCTION

Sexually Transmitted Infections (STIs) represent a considerable Public Health issue in both women and men. After the progress made in the past century, the incidence of STIs is now growing both in developed and developing countries because of economic, sociological and demographic factors [1]. Although in the second half of the last century the spread of effective screening and prevention tools, such as Pap test and HBV vaccine, has led to important improvements in many countries in terms of incidence and mortality of cervical and hepatocellular cancer and cirrhosis, there is still a great concern about STIs. Anyway, none of screening and prevention programmes has had a decisive impact in the control of STIs [2]. In this scenario, young women appear as the most affected by this “development deficit” of the potential of STIs prevention. As an example, cervical cancer is the second most common cancer after breast cancer in European women aged 15-44 years [3]: incidence of this kind of cancer rank in fact much higher for the age group 14-45 compared to all ages. Moreover this kind of infections may lead to dangerous consequences, like infertility and pre-term deliveries, not to mention neonatal contagion and vertical transmission of some diseases [1, 4-8].

Many studies [9-12] have demonstrated that the knowledge of the cultural, sociological and demographic context is extremely important for the design and the success of Public Health programs in the field of STIs prevention because they determine women’s behaviour and decisions by affecting:

- What women know about the disease and how easily they can acquire new knowledge;
- How precisely they can assess their individual risk;
- How they build up their decision and resolve in relation to sexual behaviour.

Furthermore, it has to be considered that, because of sociological and behavioural elements, the prevention programs of various STIs could influence one another. Paradoxically, success in HPV vaccination programs could result in higher risks of other STIs [13].

A relevant point about STIs prevention is thus related to the fact that contagion depends on the behaviour of people, much more than it happens for other classes of pathologies. Behaviour in turn is determined essentially

by information and education. This makes surveys like ours ever more important for Public Health managers and decision makers involved in allocating resources and designing the prevention programmes in the field of STIs.

## Aims

The aim of this study was to gather information on knowledge, attitudes and behaviour of young women about STIs and thus to provide support for decisions of women to whom prevention programmes are addressed.

## METHODS

This was a pilot survey, carried out among women aged 18-25 years and performed in order to find out the level of knowledge, attitudes and behaviour about STIs and preventive measures, and deepen the understanding of variables associated to them.

### Study population

The study population consisted of 313 women, older than eighteen, attending university courses of Medicine, Economics, Motor Sciences and Liberal Arts, at the Catholic University of the Sacred Heart of Rome, Ancona University and Cassino University.

Due to the pilot characteristics of study, an opportunistic sample was selected among students attending lectures. No ethical approval was needed because this is an observational study.

### Questionnaire

The questionnaire was designed by the researchers of the Research Centre of Health Technology Assessment of the Institute of Hygiene of the Catholic University of the Sacred Heart and was anonymous. It was composed of different parts accounting for:

- Knowledge about STIs, including ways to avoid transmission and attitudes toward them (6 questions);
- Knowledge about vaccines in general (3 questions) and Pap test (1 question);
- Knowledge and attitudes toward Pap

- test and HPV vaccination (8 questions);
- Sexual behaviour (3 questions);
- General socio-demographic characteristics (4 questions).

The possible answers were coded as multiple choice (see Table 1).

The questionnaire was administered at the beginning of lesson time and women were asked to hand it back in 20 minutes. All women were asked also to sign the authorisation of anonymous data processing and use, which is legally mandatory in Italy.

### Statistical analysis

Concerning sample size calculations, we have fixed the following parameters:

- 60% of young women with correct knowledge about STIs [14];
- a size population of 1,960,000 [15, 16];
- a worst acceptable result of 50%;
- 95% level of confidence.

The sample size obtained using EpiInfo sample size software with a power of 80%, 153 questionnaires would have been needed.

Data were collected and processed in order to make a descriptive analysis of the level of knowledge about STIs, sexual behaviour and prevention tools, like vaccines and Pap test. Not all the questions were anyway evaluated in this paper.

The reliability of the questionnaire was assessed through the computation of the Cronbach's Alpha; a value higher than 0.70 was considered a proof of a good consistency.

Univariate analysis was carried out to study variables associated to a right knowledge of STIs ways of transmission and of Pap test: Chi-square test and Mann-Whitney test were applied for categorical and continuous data, respectively. Furthermore, a multivariable analysis was performed gathering into the model all the variables with a p-value less than 0.25 at the univariate analysis and the age. The final model was built up through a stepwise approach (Backward elimination procedure) and the Goodness of Fit was assessed through the Hosmer and Lemeshow statistics.

The significant level was set at  $p \leq 0.05$  and results were reported in terms of Odds Ratio (OR) and 95% Confidence Interval (95%CI).

Statistical analysis was carried out using SPSS 21.0 for Windows.

## RESULTS

Three hundred and thirteen questionnaires were delivered and 285 were filled out (response rate: 91.1%). One hundred women belonged to the Catholic University of the Sacred Heart of Rome, 82 to Ancona University and 103 to Cassino University. Non responders did not differ from responders in terms of age.

The questionnaire showed a very good reliability being the Cronbach's Alpha 0,823.

The analysis was conducted on a total of 285 women, whose mean age was 21.95 (Standard Deviation [SD]: 3.76). Among the 267 (93.7%) women whose region of origin was reported, 189 (70.8%) came from the central regions of Italy, 75 (28.3%) from the southern ones and 3 (1.1%) from the northern ones. Sixty-six (32.0%) women declared to have regular sexual intercourse (>2 times a week) and 128 (60.1%) to have had only one sexual partner in the last 3 years; 151 (53.0%) women used condom as birth-control method (data not shown).

### STIs knowledge

Knowledge of STIs seems to be weak: in fact, only 8 (2.8%) and 18 (6.3%) women ticked respectively gonorrhoea and trichomonas as STIs; moreover only 44 (15.4%) knew genital warts as being an STI (Table 1).

Although 224 (80.0%) women know that STIs do not always heal and 240 (85.4%) that STIs can cause chronic inflammations in both sexes, only 157 (56.3%) and 128 (47.4%) are aware that STIs can cause, in both genders, sterility and cancer respectively (Table 1).

Results of the univariate analysis about the knowledge of STIs ways of transmission are shown in Table 2; 221 (77.5%) women rightly knew how STIs are contracted. Seventy three point eight per cent and 81.4% of women, among those with a low and medium-high level of knowledge of STIs respectively, showed to be aware of STIs ways of transmission (OR for women with high-medium level of knowledge 1.56, 95%CI 0.89-2.74). In relation to the question "Is always possible to heal STIs?" 79.9% of women who rightly answered had a correct knowledge of ways of transmission of STIs compared to 68.9% who incorrectly answered it (OR for women who provided a wrong

TABLE 1

| KNOWLEDGE ON SEXUALLY TRANSMITTED INFECTIONS (STIS) ISSUES IN THE STUDY POPULATION |                  |            |
|------------------------------------------------------------------------------------|------------------|------------|
| VARIABLES                                                                          |                  | N (%)      |
| Knowledge about STIs                                                               | Gonorrhea        | 8 (2.8)    |
|                                                                                    | Syphilis         | 238 (83.5) |
|                                                                                    | TBC              | 13 (4.6)   |
|                                                                                    | AIDS             | 282 (98.9) |
|                                                                                    | Herpes genitalis | 243 (85.3) |
|                                                                                    | Genital warts    | 44 (15.4)  |
|                                                                                    | Trichomonas      | 18 (6.3)   |
|                                                                                    | Urethritis       | 22 (7.7)   |
|                                                                                    | Scabies          | 20 (7.0)   |
|                                                                                    | Brucellosis      | 2 (0.7)    |
| Can you always heal STIs? (280)                                                    | Hepatitis B      | 135 (47.4) |
|                                                                                    | No               | 224 (80.0) |
|                                                                                    | Yes              | 3 (1.1)    |
| Can STIs trigger chronic inflammations? (281)                                      | Don't know       | 53 (18.9)  |
|                                                                                    | Only in males    | 6 (2.1)    |
|                                                                                    | Only in females  | 12 (4.3)   |
|                                                                                    | In both sexes    | 240 (85.4) |
| Can STIs cause sterility? (279)                                                    | Don't know       | 53 (18.9)  |
|                                                                                    | Only in males    | 40 (14.3)  |
|                                                                                    | Only in females  | 20 (7.2)   |
| Can STIs cause cancer? (270)                                                       | In both sexes    | 157 (56.3) |
|                                                                                    | Don't know       | 52 (22.2)  |
|                                                                                    | Only in males    | 5 (1.9)    |
|                                                                                    | Only in females  | 69 (25.6)  |
|                                                                                    | In both sexes    | 128 (47.4) |
|                                                                                    | Don't know       | 68 (25.2)  |

answer 0.56, 95%CI 0.30-1.05). About methods of prevention for STIs, 85.3% of women who knew which of them are effective had a right knowledge of STIs ways of transmission in comparison to the 67.2% of women who choose ineffective methods, such as birth-control pill (OR for the first group 2.83, 95%CI 1.59-5.02). Interestingly, a significantly higher percentage of women who took information about STIs from Internet, books and TV knew also about STIs ways of transmission (83.2% vs. 67.3%, OR 2.40, 95%CI 1.36-4.22). With regard to methods used during sexual intercourses, 86.8% of women who declared to use natural methods rightly knew about ways of contracting STIs (vs. 75.4% among those who did not state to use them, OR 2.14, 95%CI 0.92-5.01). No

significant differences were observed between women with a right and a wrong knowledge of STIs ways of transmission in relation to further methods used during sexual intercourses, STI consequences, vaccine definition, vaccine and Pap test knowledge, number of sexual intercourses and of partners, age and university. Anyway, the multivariable analysis (Table 4) showed a lower probability to know about the STIs ways of transmission for students belonging to Cassino University (OR 0.38, 95%CI 0.17-0.87); furthermore, the analysis confirmed the higher probability to know the ways of contracting STIs for women who were aware of the ways to prevent transmission (OR 2.77, 95%CI 1.47-5.23), got information from Internet, books and TV (OR 2.99, 95%CI 1.62-

TABLE 2

| SOCIO-DEMOGRAPHIC AND CULTURAL ISSUES ASSOCIATED WITH KNOWLEDGE OF STIS WAYS OF TRANSMISSION (CORRECT AND INCORRECT)                           |               |              |                    |          |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|--------------------|----------|
| WAYS OF CONTRACTING STIS                                                                                                                       | INCORRECT (%) | CORRECT (%)  | OR (95%CI)         | P        |
| Age (Mean [SD])                                                                                                                                | 21.86 [2.92]  | 21.98 [3.99] | 1.00 (0.94 – 1.09) | 0.74*    |
| <b>UNIVERSITY</b>                                                                                                                              |               |              |                    |          |
| Ancona                                                                                                                                         | 18.3          | 81.7         | 1                  | 0.21^    |
| Cassino                                                                                                                                        | 28.2          | 71.8         | 0.57 (0.28-1.16)   |          |
| Rome                                                                                                                                           | 20.0          | 80.0         | 0.90 (0.43-1.88)   |          |
| <b>STIS KNOWLEDGE LEVEL</b>                                                                                                                    |               |              |                    |          |
| Low (<4 correct answers)                                                                                                                       | 26.2          | 73.8         | 1                  | 0.12^    |
| Medium-high (≥4 correct answers)                                                                                                               | 18.6          | 81.4         | 1.56 (0.89-2.74)   |          |
| <b>ALWAYS POSSIBLE TO HEAL STIS</b>                                                                                                            |               |              |                    |          |
| No                                                                                                                                             | 20.1          | 79.9         | 1                  | 0.07^    |
| Yes/ Don't know                                                                                                                                | 31.1          | 68.9         | 0.56 (0.30-1.05)   |          |
| <b>STIS CONSEQUENCES (CHRONIC INFLAMMATIONS, STERILITY, CANCER)</b>                                                                            |               |              |                    |          |
| In both sexes                                                                                                                                  | 20.5          | 79.5         | 1                  | 0.57^    |
| Only in men /only in women                                                                                                                     | 23.7          | 76.3         | 1.20 (0.63-2.29)   |          |
| <b>RIGHT PREVENTION OF STIS</b>                                                                                                                |               |              |                    |          |
| Incorrect answers (genital hygiene after sexual intercourse, antibiotics after suspicious intercourse, use of birth-control pill, none, other) |               |              | 1                  | < 0.001^ |
| Use of condom and intercourses only with a known partner                                                                                       |               |              | 2.83 (1.59-5.02)   |          |
| <b>INFORMATION ABOUT STIS FROM PARENTS AND FRIENDS</b>                                                                                         |               |              |                    |          |
| No                                                                                                                                             | 22.9          | 77.1         | 1                  | 0.64^    |
| Yes                                                                                                                                            | 19.4          | 80.6         | 1.23 (0.51-2.96)   |          |
| <b>INFORMATION ABOUT STIS FROM GENERAL PRACTITIONERS AND GYNECOLOGISTS</b>                                                                     |               |              |                    |          |
| No                                                                                                                                             | 21.0          | 79.0         | 1                  | 0.75^    |
| Yes                                                                                                                                            | 22.9          | 77.1         | 0.90 (0.45-1.78)   |          |
| <b>INFORMATION ABOUT STIS FROM INTERNET, BOOKS AND TV</b>                                                                                      |               |              |                    |          |
| No                                                                                                                                             | 32.7          | 67.3         | 1                  | 0.002^   |
| Yes                                                                                                                                            | 16.8          | 83.2         | 2.40 (1.36-4.22)   |          |
| <b>VACCINE DEFINITION</b>                                                                                                                      |               |              |                    |          |
| Incorrect                                                                                                                                      | 22.2          | 77.8         | 1                  | 1^       |
| Correct                                                                                                                                        | 22.0          | 78.0         | 1.01 (0.21-5.01)   |          |
| <b>VACCINE SIDE EFFECTS</b>                                                                                                                    |               |              |                    |          |
| Only in a few cases                                                                                                                            | 21.0          | 79.0         | 1                  | 0.10^    |
| Yes / No / Don't know                                                                                                                          | 34.5          | 65.5         | 1.98 (0.87-4.53)   |          |
| <b>PAP TEST KNOWLEDGE</b>                                                                                                                      |               |              |                    |          |
| No                                                                                                                                             | 32.5          | 67.5         | 1                  | 0.12^    |
| Yes                                                                                                                                            | 21.3          | 78.8         | 1.78 (0.86-3.70)   |          |
| <b>NUMBER OF SEXUAL INTERCOURSES</b>                                                                                                           |               |              |                    |          |
| More than 2/week                                                                                                                               | 19.7          | 80.3         | 2.15 (0.81-5.70)   | 0.26^    |
| 2/week or 1/week or 1-2/month                                                                                                                  | 21.6          | 78.4         | 1.91 (0.78-4.64)   |          |
| Less than 1/month                                                                                                                              | 34.5          | 65.5         | 1                  |          |
| <b>NUMBER OF PARTNERS IN THE LAST 3 YEARS</b>                                                                                                  |               |              |                    |          |
| 1                                                                                                                                              | 25.0          | 75.0         | 0.54 (0.19-1.50)   | 0.41^    |
| 2                                                                                                                                              | 19.2          | 80.8         | 0.75 (0.23-2.43)   |          |
| 3 or more                                                                                                                                      | 15.2          | 84.8         | 1                  |          |
| <b>NATURAL METHODS USED IN SEXUAL INTERCOURSES (BILLINGS' METHOD, COITUS INTERRUPTUS, BASAL BODY TEMPERATURE METHOD)</b>                       |               |              |                    |          |
| No                                                                                                                                             | 24.6          | 75.4         | 1                  | 0.07^    |
| Yes                                                                                                                                            | 13.2          | 86.8         | 2.14 (0.92-5.01)   |          |
| <b>NO METHOD USED FOR STIS PREVENTION</b>                                                                                                      |               |              |                    |          |
| No                                                                                                                                             | 22.3          | 77.7         | 1                  | 0.80^    |
| Yes                                                                                                                                            | 25.0          | 75.0         | 0.86 (0.27-2.77)   |          |
| <b>CONDOM USED FOR STIS PREVENTION</b>                                                                                                         |               |              |                    |          |
| No                                                                                                                                             | 21.6          | 78.4         | 1                  | 0.76^    |
| Yes                                                                                                                                            | 23.2          | 76.8         | 0.92 (0.52-1.60)   |          |
| <b>OTHER BIRTH-CONTROL METHODS</b>                                                                                                             |               |              |                    |          |
| No                                                                                                                                             | 23.5          | 76.5         | 1                  | 0.43^    |
| Yes                                                                                                                                            | 18.6          | 81.4         | 1.34 (0.65-2.76)   |          |

\*Mann-Whitney test; ^Chi-square test.

TABLE 3

| SOCIO-DEMOGRAPHIC AND CULTURAL ISSUES ASSOCIATED WITH KNOWLEDGE OF PAP TEST SCREENING                                                          |               |             |                  |       |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|------------------|-------|
| WAYS OF CONTRACTING STIS                                                                                                                       | INCORRECT (%) | CORRECT (%) | OR (95%CI)       | P     |
| Age (Mean [SD])                                                                                                                                | 21.4 [2.5]    | 22.0 [4.0]  | 1.05 (0.95-1.17) | 0.34* |
| <b>UNIVERSITY</b>                                                                                                                              |               |             |                  |       |
| Ancona                                                                                                                                         | 9.1           | 90.9        | 1                | 0.21^ |
| Cassino                                                                                                                                        | 18.4          | 81.6        | 0.44 (0.18-1.11) |       |
| Rome                                                                                                                                           | 14.0          | 86.0        | 0.61 (0.24-1.61) |       |
| <b>STIS KNOWLEDGE LEVEL</b>                                                                                                                    |               |             |                  |       |
| Low (<4 correct answers)                                                                                                                       | 19.0          | 81.0        | 1                | 0.02^ |
| Medium-high (≥4 correct answers)                                                                                                               | 9.4           | 90.6        | 2.26 (1.11-4.59) |       |
| <b>ALWAYS POSSIBLE TO HEAL STIS</b>                                                                                                            |               |             |                  |       |
| No                                                                                                                                             | 14.3          | 85.7        | 1                | 1.00^ |
| Yes/ Don't know                                                                                                                                | 14.3          | 85.7        | 1.00 (0.43-2.31) |       |
| <b>STIS CONSEQUENCES (CHRONIC INFLAMMATIONS, STERILITY, CANCER)</b>                                                                            |               |             |                  |       |
| In both sexes                                                                                                                                  | 15.6          | 84.4        | 1                | 0.83^ |
| Only in men /only in women                                                                                                                     | 14.6          | 85.4        | 0.93 (0.44-1.93) |       |
| <b>RIGHT PREVENTION OF STIS</b>                                                                                                                |               |             |                  |       |
| Incorrect answers (genital hygiene after sexual intercourse, antibiotics after suspicious intercourse, use of birth-control pill, none, other) | 19.2          | 80.8        | 1                | 0.04^ |
| Use of condom and intercourses only with a known partner                                                                                       | 10.6          | 89.4        | 2.00 (1.01-3.93) |       |
| <b>INFORMATION ABOUT STIS FROM PARENTS AND FRIENDS</b>                                                                                         |               |             |                  |       |
| No                                                                                                                                             | 15.4          | 84.6        | 1                | 0.19^ |
| Yes                                                                                                                                            | 5.9           | 94.1        | 2.92 (0.67-12.7) |       |
| <b>INFORMATION ABOUT STIS FROM GENERAL PRACTITIONERS AND GYNECOLOGISTS</b>                                                                     |               |             |                  |       |
| No                                                                                                                                             | 22.0          | 78.0        | 1                | 0.06^ |
| Yes                                                                                                                                            | 12.2          | 87.8        | 2.03 (0.97-4.24) |       |
| <b>INFORMATION ABOUT STIS FROM INTERNET, BOOKS AND TV</b>                                                                                      |               |             |                  |       |
| No                                                                                                                                             | 14.0          | 86.0        | 1                | 0.92^ |
| Yes                                                                                                                                            | 14.4          | 85.6        | 0.96 (0.48-1.94) |       |
| <b>VACCINE DEFINITION</b>                                                                                                                      |               |             |                  |       |
| Incorrect                                                                                                                                      | 12.5          | 87.5        | 1                | 1^    |
| Correct                                                                                                                                        | 14.5          | 85.5        | 0.84 (0.10-7.04) |       |
| <b>VACCINE SIDE EFFECTS</b>                                                                                                                    |               |             |                  |       |
| Only in a few cases                                                                                                                            | 13.9          | 86.1        | 1                | 0.40^ |
| Yes / No / Don't know                                                                                                                          | 20.7          | 79.3        | 1.61 (0.61-4.25) |       |
| <b>STIS WAYS OF TRANSMISSION</b>                                                                                                               |               |             |                  |       |
| Incorrect                                                                                                                                      | 20.3          | 79.7        | 1                | 0.12^ |
| Correct                                                                                                                                        | 12.5          | 87.5        | 1.78 (0.86-3.70) |       |
| <b>EVER TAKEN A PAP TEST?</b>                                                                                                                  |               |             |                  |       |
| No                                                                                                                                             | 15.7          | 84.3        | 1                | 0.15^ |
| Yes                                                                                                                                            | 7.8           | 92.2        | 2.19 (0.74-6.46) |       |
| <b>NUMBER OF SEXUAL INTERCOURSES</b>                                                                                                           |               |             |                  |       |
| More than 2/week                                                                                                                               | 9.5           | 90.5        | 2.48 (0.72-8.49) | 0.34^ |
| 2/week or 1/week or 1-2/month                                                                                                                  | 13.8          | 86.2        | 1.64 (0.57-4.68) |       |
| Less than 1/month                                                                                                                              | 20.7          | 79.3        | 1                |       |
| <b>NUMBER OF PARTNERS IN THE LAST 3 YEARS</b>                                                                                                  |               |             |                  |       |
| 1                                                                                                                                              | 15.2          | 84.8        | 0.80 (0.25-2.53) | 0.92^ |
| 2                                                                                                                                              | 13.7          | 86.3        | 0.90 (0.24-3.35) |       |
| 3 or more                                                                                                                                      | 12.5          | 87.5        | 1                |       |
| <b>NATURAL METHODS USED IN SEXUAL INTERCOURSES (BILLINGS' METHOD, COITUS INTERRUPTUS, BASAL BODY TEMPERATURE METHOD)</b>                       |               |             |                  |       |
| No                                                                                                                                             | 15.4          | 84.6        | 1                | 0.29^ |
| Yes                                                                                                                                            | 9.6           | 90.4        | 1.71 (0.63-4.59) |       |
| <b>NO METHOD USED FOR STIS PREVENTION</b>                                                                                                      |               |             |                  |       |
| No                                                                                                                                             | 14.0          | 86.0        | 1                | 0.71^ |
| Yes                                                                                                                                            | 18.8          | 81.2        | 0.71 (0.19-2.60) |       |
| <b>CONDOM USED FOR STIS PREVENTION</b>                                                                                                         |               |             |                  |       |
| No                                                                                                                                             | 12.7          | 87.3        | 1                | 0.46^ |
| Yes                                                                                                                                            | 15.8          | 84.2        | 0.78 (0.40-1.53) |       |
| <b>OTHER BIRTH-CONTROL METHODS</b>                                                                                                             |               |             |                  |       |
| No                                                                                                                                             | 14.9          | 85.1        | 1                | 0.59^ |
| Yes                                                                                                                                            | 12.1          | 87.9        | 1.27 (0.53-3.04) |       |

\*Mann-Whitney test; ^Chi-square test.



TABLE 4

| FACTORS ASSOCIATED WITH KNOWLEDGE OF STIS WAYS OF TRANSMISSION AND KNOWLEDGE OF PAP TEST (MULTIVARIABLE LOGISTIC ANALYSIS)                     |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| KNOWLEDGE OF STIS WAYS OF TRANSMISSION <sup>^</sup>                                                                                            | OR (95%CI)       |
| <b>UNIVERSITY</b>                                                                                                                              |                  |
| Ancona                                                                                                                                         | 1                |
| Cassino                                                                                                                                        | 0.38 (0.17-0.87) |
| Rome                                                                                                                                           | 0.49 (0.21-1.14) |
| <b>ALWAYS POSSIBLE TO HEAL STIS</b>                                                                                                            |                  |
| No                                                                                                                                             | 1                |
| Yes/ Don't know                                                                                                                                | 0.42 (0.20-0.88) |
| <b>RIGHT PREVENTION OF STIS</b>                                                                                                                |                  |
| Incorrect answers (genital hygiene after sexual intercourse, antibiotics after suspicious intercourse, use of birth-control pill, none, other) | 1                |
| Use of condom and intercourses only with a known partner                                                                                       | 2.77 (1.47-5.23) |
| <b>INFORMATION ABOUT STIS FROM INTERNET, BOOKS AND TV</b>                                                                                      |                  |
| No                                                                                                                                             | 1                |
| Yes                                                                                                                                            | 2.99 (1.62-5.53) |
| <b>NATURAL METHODS USED IN SEXUAL INTERCOURSES (BILLINGS' METHOD, COITUS INTERRUPTUS, BASAL BODY TEMPERATURE METHOD)</b>                       |                  |
| No                                                                                                                                             | 1                |
| Yes                                                                                                                                            | 2.55 (1.05-6.18) |
| <b>KNOWLEDGE OF PAP TEST<sup>°</sup></b>                                                                                                       |                  |
| AGE                                                                                                                                            | 1.14 (0.98-1.32) |
| <b>UNIVERSITY</b>                                                                                                                              |                  |
| Ancona                                                                                                                                         | 1                |
| Cassino                                                                                                                                        | 0.25 (0.09-0.73) |
| Rome                                                                                                                                           | 0.56 (0.21-1.48) |
| <b>ALWAYS POSSIBLE TO HEAL STIS</b>                                                                                                            |                  |
| Low (< 4 correct answers)                                                                                                                      | 1                |
| Medium-high (≥4 correct answers)                                                                                                               | 2.11 (1.02-4.37) |

<sup>^</sup>Hosmer and Lemeshow: 0.864; <sup>°</sup>Hosmer and Lemeshow: 0.344

5.53) and declared to use natural methods in sexual intercourses (OR 2.55, 95%CI 1.05-6.18). Finally, the multivariable analysis confirmed that women who stated that it is possible to heal from STIs or who did not know about it had a lower probability to give a right answer with regard to ways of transmission (OR 0.42, 95%CI 0.20-0.88).

#### Knowledge about preventive measures and Pap test

Two hundred and seventy five (96.8%, on a total of 284 answers given) women knew that STIs can be prevented by the use of condom,

but only 167 (58.6%) believed that intercourses with a single known partner are an effective way to prevent STIs. Altogether only 163 (57.2%) women gave both the right answers (use of condom and intercourses with a single known partner).

Two hundred and seventy three (96.8%, on a total of 282 answers given) women knew that a vaccine is a health technology that helps preventing a disease and 266 (94.0%, on a total of 283 answers given) knew that only few vaccinations are compulsory in Italy. One hundred and fifty seven (56.7%, on a total of 277 answers given) correctly knew that vaccines can determine side effects only in a

limited number of cases. Two hundred and forty women (85.7%) on a total number of 280 answering knew about Pap test, but 234 (82.1%) never took it.

Results of the univariate analysis on the knowledge of Pap test are shown in Table 3.

Ninety point six per cent of women who had a medium-high level of knowledge of STIs knew about Pap test, compared to 81.0% of women with a low level (OR for the first group 2.26, 95%CI 1.11-4.59); the knowledge of Pap test was demonstrated in 89.4% of women answering that the use of condom together with intercourses with a single known partner are effective behaviours for preventing STIs and in 80.8% of women who gave incorrect answers to the same question (OR for the first group 2.00, 95%CI 1.01-3.93); as far as sources of information on STIs are concerned, 87.8% of women who got news from General Practitioners and Gynaecologists were acquainted with Pap test vs. 78.0% of women who got news from other sources (OR for the first group 2.03, 95%CI 0.97-4.24). Not statistically relevant differences were found between the two groups in relation to healing of STIs, STIs consequences, vaccine knowledge, number of sexual intercourses and partners, age and university, as well as for methods used for STIs prevention (natural, condom, birth-control or none) and undertaking Pap test. Anyway, the multivariable analysis (Table 4), beyond confirming the role of STIs level of knowledge with an OR of 2.11 (95%CI 1.02-4.37) for women with a high-medium level, showed a lower probability to know about Pap test for women belonging to Cassino University (OR 0.25, 95%CI: 0.09-0.73).

## DISCUSSION

Our survey found that knowledge about STIs and their prevention is still poor among young Italian women, confirming the results of other studies conducted among university students [17, 18]. As demonstrated in a recent systematic review on this topic [19], this is a situation also true for carcinogenic lesions such as genital warts due to HPV, unfortunately diffused worldwide. On the contrary, from our results knowledge about vaccination in general and vaccination side effects appears good but shallow, as only half of our study

population knew about the possibility of vaccination side effects. Knowledge is related to behaviour: an example could be the attitude of patients towards the HPV vaccination recently introduced in the Italian Regional Vaccination Plans [20, 21].

The risk factors identified in our survey were the following: the level of knowledge concerning STIs and their prevention, and the different sources of information. Unexpectedly, women with a high educational level - all attending university - have a lack of information and consciousness about STIs: it could be reasonable to expect this situation even worse for women with a lower level of education.

Most women are informed about the existence of STIs but underestimate them: more in terms of how many and which infections are sexually transmitted and less in terms of how they can acquire them. In this context it is important to discuss the role of sources of information about STIs: our survey showed that a higher percentage of women who acquired information through Internet, TV and books were aware of STIs ways of transmission than women not using these sources. The importance of TV, Internet and print media was underlined also by Lengen et al. [10] who concluded, by means of a specific model that sexual behaviour depends especially on sex education acquired through media. Sammarco et al. too in their survey conducted among Italian university students focused on the role of TV, radio and the printed press, which were demonstrated to be the most common sources of information (>60% of respondents) for HIV/AIDS knowledge [22]. Anyway it might be opened to discussion whether these ways of information are really educational or just superficially informative for most people: it is actually well known that Internet does not always convey truthful and correct news, as not all the sites with medical content are revised by physicians or experts. The same is valid for TV and even for some kinds of books. Above all it cannot be forgotten the key role of medical doctors in informing patients about all medicine subjects, especially about STIs and their prevention.

Another interesting finding of our survey was that 86.8% of women declaring to use natural methods correctly answered about STIs ways of transmission, in comparison to 75.4% of those who used other methods: this



finding, confirmed also by the multivariable approach, is probably due to confusion between tools for birth control and for preventing STIs. The same conclusion was made in other less recent studies [23, 24]. The real scenario present in Italy could be underestimated, especially looking at adolescents [25]: teenagers in fact showed an appreciable and increasing risk for a broad spectrum of STIs, and in the cited study they represented 3.6-13.3% of patients.

Almost all women interviewed proved to be informed about Pap test, even if a large majority of them never took it, because of age. Interestingly, the knowledge of Pap test as a prevention tool was significantly associated with the level of knowledge of STIs and with the adoption of right measures to prevent them and, particularly, with the level of knowledge of STIs. This shows that the sensitisation of women on preventive measures, not only at a secondary level (i.e. screening, physicians consults), but even more at a primary one (for example by public education, billboards and vaccination campaigns against HPV), should tie in with a wide and thorough knowledge of the topic, as confirmed by other Authors [26, 27]. Moreover, the willingness of being informed is often requested by the same recipients of the preventive measures: for example, Kennedy and Roberts described the strong desire expressed by young multiethnic college women recruited in their study for someone to teach them “real information” on sexuality, as this information was missing in their health education courses [28].

To conclude, the main message of our survey is about the implementation of sexual education of young women: new programmes and tools should be promoted in order to spread knowledge and raise awareness about STIs and their prevention and consequences. General practitioners and Gynaecologists could be the leaders of these processes. The potential of media should also be considered and exploited. Prevention represents one of the most effective weapons to control the spreading of STIs and information and education are fundamental for making prevention really effective at mass level [27]. For STIs prevention, information and education double their value: they have an indirect one, common to all pathologies, as they can make medical means and screening tools widely known, accepted and used, and

a direct one, as they can modify behaviour at mass level, which is of special importance for STIs, as it is prevention in itself. Thus prevention, for STIs, not only means to inform about physiology, diseases, vaccines, screening tests, but also to cope with cultural, social and even emotional reasons that coax people to behaviours at risk. Assessment of knowledge, attitudes and behaviours at risk for STIs in young women is one of the first steps for successful preventive measures: young women are the main target of present and future screening and vaccination campaigns and, at the same time, the ideal target of specific information and education campaigns, as they are open-minded and potential future vehicles of information for children and therefore for young adults of tomorrow. Campaigns are to be specific and addressed to target populations, taking into account their weak and strong point in knowledge, attitude and current behaviour. This is actually the reason why, as to explore the same aspects as La Torre et al.[29] and del Prete and coll. [30] did with a different target population, we delivered our questionnaire to young women attending university.

The major strengths of our study are about the sample size and the setting. As far as the first issue, even considering a possible amount of 40% of non responders 153 questionnaires would have been needed in comparison to the 313 we delivered. Moreover, the university students' setting was useful to identify possible issues related to STIs that could be applied to the general population.

Our study however has some limits. First of all, albeit the questionnaire employed was anonymous and self-filled, we cannot exclude a misclassification due to untrue answers or to questions not fully understood. Moreover, because of the study design, we are not able to conclude anything about causality. Finally, the sample, even if quite numerous, is not representative of all the national population, neither of specific categories of women at major risk of STIs, because of the opportunistic choice.

## CONCLUSIONS

Our study demonstrated that women aged 18-25 years with a relatively high educational level are not completely aware of STIs risks

and preventive measures. Informational and educational campaigns should be implemented to reach this target group and lighten the current and future burden of STIs.

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