Abstract

Introduction: Some Japanese women are known to have negative attitudes toward erectile dysfunction (ED) drugs, but the environment underlying these perceptions is unclear.

Aim: To reveal the underlying environment that shapes women’s perceptions of ED drugs in Japan.

Methods: A web-based questionnaire was conducted through an internet-based market research company. A total of 2,593 women in five age groups (20s, 30s, 40s, 50s, and 60s or older) were randomly invited to participate in this study, with an almost equal number in each age group. The questionnaire contained 30 items related to individual background and sexual information, concerns about the image of ED drugs, ED drug-related perceptions, and attitude toward sexual information media.

Main Outcome Measures: The women’s attitude and the independent predictors that affect their partner’s use of ED drugs were clarified.

Results: Answers were obtained from 1,077 women, of whom 35.4% (n=381) had a negative image of ED drugs. Although 69.5% (n=749) agreed that a sexual relationship with a male partner was important, only 26.7% (n=288) agreed that this remained important if ED drugs were used. However, 56.7% (n=611) and 57.7% (n=621) of respondents, respectively, answered that they would allow their partner’s use of ED drugs if they imagined that they understood the safety and effectiveness of ED drugs and that their quality of life was
improved by their partner's use of the drugs. Lack of information about ED drugs was a significant predictor for acceptance of a partner's use of ED drugs among women with a negative image of ED drugs, since they were more likely to accept the use of these drugs if they were convinced about their safety and effectiveness or positive effect on quality of life.

Conclusion: Lack of information about ED drugs may influence the perception of women in Japan regarding these drugs.
Introduction

Erectile dysfunction (ED) is a universal problem for both men and women.\textsuperscript{1,2} The emergence of drugs for ED has had a dramatic impact and altered the way in which ED is regarded,\textsuperscript{3-7} but it has been reported that women participating in focus group discussions in three Asian countries viewed the possibility of their husbands starting to take ED drugs with suspicion, mistrust and fear.\textsuperscript{8} ED drugs can undoubtedly improve the quality of life (QOL) for men with ED and for their partners,\textsuperscript{9-12} but we have previously found that a high proportion of Japanese women have negative attitudes toward these drugs.\textsuperscript{13} However, the environment underlying these perceptions is unclear.

Aim

The aim of this study was to reveal the underlying environment shaping women's perceptions of ED drugs in Japan.

Methods

At the end of September 2006, an online questionnaire survey was conducted through an internet-based market research company (Yahoo! Japan Research, Tokyo, Japan). As of 26 September 2006, this company had enrolled 534,759 men and women who had given informed consent that their personal responses could be used in a Web study and made available to the
public with elimination of all personal identifiers. Before starting the online survey, women contracted with the research company were separated into five age groups: 20s, 30s, 40s, 50s, and 60s or older. A total of 2,593 women (with an almost equal number from each age group) were then randomly invited to participate in the study. The numbers of subjects in individual prefectures indicated that they were distributed equally around the nation.

Since there was neither a validated test for female sexual function that has been translated into Japanese nor an available questionnaire to examine the underlying environment affecting women's perception of ED drugs at the end of September 2006, we created an original questionnaire for this study. As a preliminary investigation for preparation of the questionnaire, we performed an attitude survey on ED drugs with Japanese female volunteers, based on the results of past investigations on ED drugs. This suggested that the image of ED drugs may be affected by the access route, side effects, usage and price, as well as their impact on the body. According to these findings, we developed hypotheses regarding women's opinions and designed a questionnaire that contained 30 items (Appendix A). The first question on the questionnaire asked whether participants had a negative image of ED drugs (Q1 in Appendix A). The next fifteen items addressed individual background and sexual information (Q2 to Q16 in Appendix A), nine items addressed possible concerns affecting the image of ED drugs (Q17 to Q25 in Appendix A), two items addressed ED drug-related perceptions (Q26 and Q27 in Appendix A), and three items
addressed attitude toward sexual information media (Q28 to Q30 in Appendix A).
The answers for most questions were "yes" or "no". Much of the data was
based on hypothetical opinions, with women asked to state how they might feel if
they imagined that they had certain knowledge about ED drugs. Information
about age had already been registered for all participants and was analyzed as
one factor.

To clarify the underlying environment related to women’s perceptions of ED
drugs, the following analyses were carried out.
1) Comparison of women's attitudes to their partner's use of ED drugs if
women imagined that they understood the advantage of ED drugs under
different conditions (Q15, Q26 and Q27 in Appendix A).
2) A multivariate analysis was performed for women who had a negative image
of ED drugs, with 9 items (Q17 to Q25 in Appendix A) and age used as possible
independent predictors affecting the image of ED drugs.
   i) Identification of independent predictors that significantly affected whether
women would allow their partners to use ED drugs if women imagined that they
understood the safety and effectiveness of ED drugs (Q26 in Appendix A).
   ii) Identification of independent predictors that significantly affected whether
women would allow their partners to use ED drugs if women imagined that they
understood that their use may improve quality of life (Q27 in Appendix A).
3) Using 16 items (Q2 to Q16 in Appendix A and age) related to individual
background and sexual information as independent variables, multiple logistic
regression analysis was performed to identify factors that were independent predictors of a negative image of ED drugs (Q1 in Appendix A).

Multiple logistic regression analysis and a Mann-Whitney U test were used for statistical analysis, and differences with P < 0.05 were considered significant.

**Main outcome and measures**

Women's attitudes and independent predictors that affect their partner's use of ED drugs were clarified based on a hypothetical situation in which women imagined that they understood the merits of ED drugs, such as their safety and effectiveness, or their ability to improve quality of life.

**Results**

*Summary of background and responses of participants*

A total of 1,077 women (41.5% of those initially invited) ranging in age from 20 to 85 years old participated in the study: 214 women in their 20s, 202 in their 30s, 210 in their 40s, 204 in their 50s, and 247 in their 60s or older. Of these women, 35.4% (n=381) had a negative image of ED drugs. Among all respondents, 69.5% (n=749) agreed that a sexual relationship with a male partner was important, but only 26.7% (n=288) agreed that this was still important if ED drugs were used. While 82.0% (n=883) of all respondents stated that they had a partner, 52.0% (n=560) and 9.5% (n=102) stated that they had sexual activity with a partner and stated that they had frustration about their
partner's ED, respectively. Regarding their history of sexual education, 49.5% (n=533) of all respondents stated that they had acquired accurate sex education, but 74.4% (n=801) stated that they had not received sufficient sex education. Regarding information about ED drugs, 39.5% (n=425) and 33.2% (n=358) of all respondents stated that they had an unfavorable opinion of advertisements for ED drugs in newspapers or on television, and in magazines or weekly publications for adults, respectively. There was no significant difference in responses regarding sources of sexual information between women with and without a negative image of ED drugs.

Difference in the attitude of women to partner's use of ED drugs (Table 1)

A difference in the attitude of women to their partner's use of ED drugs was observed in all age groups if the women imagined that they understood the merits of ED drugs, such as their safety and effectiveness, or their ability to improve quality of life. The percentage of women showing acceptance of their partner's use of ED drugs significantly decreased with age, but more than one-third of middle-aged respondents stated that they would accept the use of ED drugs by their partners if they imagined that they understood the merits of ED drugs.

Independent predictors that affect use of ED drugs by partners of women who have a negative image of ED drugs (Table 2)
Women who had a negative image of ED drugs felt that this image might have been due to a lack of information about ED drugs. If the women imagined that they understood that ED drugs are safe and effective, this was a predictor that positively affected the use of ED drugs by their partners (Odds Ratio (OR)=1.940, P=0.0462). Similarly, if the women understood that use of ED drugs might improve their QOL, this became a positive predictor for use of ED drugs by their partners (OR=2.126, P=0.0224).

Women who had a negative image of ED drugs also felt that this image might have been due to the side effects of ED drugs. If the women imagined that they understood that ED drugs were safe and effective, this was a predictor that positively affected use of ED drugs by their partners (OR=2.107, P=0.0234).

In contrast, advanced age and the possibility that undesirable events may occur with use of ED drugs were predictors that negatively affected use of the drugs by partners.

**Independent predictors of women's negative image of ED drugs among background factors and sexual information**

Advanced age was significantly related to a negative image of ED drugs among women (OR=1.180, P=0.0029) if the effect was assumed to be linear among the five age groups. Other background factors that were significantly associated with a negative image of ED drugs included an opinion that an accurate sex education had been acquired (OR=1.666, P=0.0012), a sexual
relationship with a partner was of no importance (OR=1.559, P=0.0101), a sexual relationship was of no importance if ED drugs are used (OR=2.766, P<0.0001), and hesitation admitting partner's ED if sexual life fails (OR=1.732, P=0.0015).

**Discussion**

The sexual activities of Japanese couples were reported to be the lowest in a worldwide investigation of sex life carried out in 29 countries. The efficacy and safety of ED drugs have been confirmed in many studies, but in this study more than one-third of the respondents had a definite negative image of these drugs. However, we found a difference in the attitude of women to their partner's use of ED drugs if they imagined that they had developed an understanding of the merits of ED drugs. For women (n=381) with a negative image of ED drugs due to insufficient information about the drugs and their side effects, development of an understanding that ED drugs have high efficacy and improve QOL was a positive predictor affecting the use of ED drugs by their partner. These findings suggest that lack of information about ED drugs causes misunderstanding in women regarding their partner's use of such drugs. On the contrary, concern about the unfavorable consequences of a partner's use of ED drugs showed no such relationship. Since ED drugs have been approved only for men in Japan, they may be unfamiliar to women, and to overcome misunderstandings adequate information about ED drugs should be made...
available to women. There were no differences in sexual information sources between women with a negative image of ED drugs and those without such an image, making it unlikely that a difference in specific information sources was responsible for the different attitudes toward ED drugs.

The percentage of women who accepted a partner's use of ED drugs gradually decreased with age and we found that age was one of the predictors for a negative image of ED drugs. A number of longitudinal studies have also demonstrated a decrease in sexual arousal and activity with aging.\textsuperscript{15,16} Apart from actual sex education, women who felt they had acquired accurate sex education had a more negative image of ED drugs compared to those who felt they had not received sufficient sex education. Because respondents who stated that they had not acquired sufficient sex education were in the majority in the study, Japanese women may find it difficult to grasp the virtue of ED drugs on the basis of the sex education they have received, or may erroneously consider that they have received accurate sex education due to the lack of sexual information in daily life. Alternatively, these findings may indicate that a generation gap or differences in the sexual environment based on availability of sex education in previous times may shape sexual attitudes.

The prevalence rate of female sexual dysfunction (FSD) of women with a male partner suffering from ED is reportedly higher than those with a partner who does not have ED,\textsuperscript{17,18} and treatment of male ED patients improves the female partner's sexual function.\textsuperscript{19} Although older Japanese women and men
attach less importance to sexual activity compared to Western Europeans, ED is a serious matter for some Japanese women. Since FSD is currently attracting attention in Japan, provision of information about ED drugs to women may be helpful for those with a male partner suffering from ED to highlight problems related to ED from a woman's perspective. However, because about one-third of respondents stated that they had an unfavorable opinion of advertisements for ED drugs, careful attention should be paid to the way this information is presented.

A substantial proportion of the general population may be unfamiliar with Web questionnaires, since access to the Internet may be biased with regard to age, sex, education, and other factors. However, according to a report from the Japanese Ministry of Internal Affairs and Communications, the Internet diffusion rate had reached 74.1% and the utilization rate was 79.3% in 2006, and more than 80% of these people use Yahoo! JAPAN. Web-based questionnaires are widely accepted in countries with a well-developed information technology infrastructure. Comparison of a 'gold standard' randomly selected population-based national sexual life survey (The Swedish Sexual Life Survey) with an Internet-based survey showed that Internet samples were comparable in terms of characteristics and history.

Our results indicate how the negative perception of women regarding ED drugs may be improved; but a limitation of the study is that our hypotheses may not be consistent with current opinions, and we did not confirm the validity of
these hypotheses. However, as a preliminary report, the results highlight the importance of supplying correct and readily available information on ED drugs to women. A second limitation is the use of a "Yes/ No" questionnaire that may not allow for a spectrum of responses, which is more likely to be accurate. The results of the questionnaire indicated a 35.4% rate for the negative image of ED drugs, which is lower than the rate of 46.4% found previously in Japan, and this difference may be due to different styles of questions and responses to the questionnaires.

Conclusion

This study shows that a lack of information on ED drugs may affect the perception of these drugs by women in Japan, and indicates the importance of supplying correct and readily available information on ED drugs to women.
References


Table 1. Difference in the attitude of women to partner's use of ED drugs (n=1,077)

### Importance of sexual relationship, even if ED drugs are used

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Yes (n=288)</th>
<th>(%)</th>
<th>No (n=789)</th>
<th>(%)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>93 (43.5)</td>
<td></td>
<td>121 (56.5)</td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>30s</td>
<td>63 (31.2)</td>
<td></td>
<td>139 (68.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40s</td>
<td>61 (29.0)</td>
<td></td>
<td>149 (71.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50s</td>
<td>34 (16.7)</td>
<td></td>
<td>170 (83.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60s or &lt;</td>
<td>37 (15.0)</td>
<td></td>
<td>210 (85.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Acceptance of partner's use of ED drugs if convinced of their safety and effectiveness

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Yes (n=611)</th>
<th>(%)</th>
<th>No (n=466)</th>
<th>(%)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>162 (75.7)</td>
<td></td>
<td>52 (24.3)</td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>30s</td>
<td>146 (72.3)</td>
<td></td>
<td>56 (27.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40s</td>
<td>122 (58.1)</td>
<td></td>
<td>88 (41.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50s</td>
<td>88 (43.1)</td>
<td></td>
<td>116 (56.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60s or &lt;</td>
<td>93 (37.6)</td>
<td></td>
<td>154 (62.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Acceptance of partner's use of ED drugs if convinced they would improve quality of life

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Yes (n=621)</th>
<th>(%)</th>
<th>No (n=456)</th>
<th>(%)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>160 (74.8)</td>
<td></td>
<td>54 (25.2)</td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>30s</td>
<td>146 (72.3)</td>
<td></td>
<td>56 (27.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40s</td>
<td>133 (63.3)</td>
<td></td>
<td>77 (36.7)</td>
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</tr>
<tr>
<td>50s</td>
<td>89 (43.6)</td>
<td></td>
<td>115 (56.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60s or &lt;</td>
<td>93 (37.7)</td>
<td></td>
<td>154 (62.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Acceptance of ED drug use by partners among women with a negative image of ED drugs (n=381)

(A) Acceptance of ED drugs if safety and effectiveness is assured

<table>
<thead>
<tr>
<th>Predictor (independent)</th>
<th>n</th>
<th>O.R.</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of information about ED drugs</td>
<td>(288)</td>
<td>1.940</td>
<td>0.0462</td>
</tr>
<tr>
<td>Side effects of ED drugs</td>
<td>(288)</td>
<td>2.107</td>
<td>0.0234</td>
</tr>
<tr>
<td>Age-group (20s, 30s, 40s, 50s, 60s or older)</td>
<td>(65, 60, 57, 90, 109)</td>
<td>0.655</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Worry about unfavorable consequences of ED drug use</td>
<td>(186)</td>
<td>0.469</td>
<td>0.0032</td>
</tr>
</tbody>
</table>

(B) Acceptance of ED drugs if improvement of quality of life is assured

<table>
<thead>
<tr>
<th>Predictor (independent)</th>
<th>n</th>
<th>O.R.</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of information about ED drugs</td>
<td>(288)</td>
<td>2.126</td>
<td>0.0224</td>
</tr>
<tr>
<td>Age-group (20s, 30s, 40s, 50s, 60s or older)</td>
<td>(65, 60, 57, 90, 109)</td>
<td>0.662</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Worry about unfavorable consequences of ED drug use</td>
<td>(186)</td>
<td>0.562</td>
<td>0.0227</td>
</tr>
</tbody>
</table>
Appendix A

In filling out this questionnaire, if you are unsure which answer to give, please choose the one most appropriate for your present situation.

Q-1) <Negative image of erectile dysfunction (ED) drugs>
Do you have a bad image of ED drugs (Viagra®, etc.)?
1 Yes, I do.  2 No, I don’t.

Q-2) <Complaints about economic situation>
Do you have any complaints about your present economic situation?
1 Yes, I do.  2 No, I don’t.

Q-3) <Employment status>
Are you employed at the moment (including part-time)?
1 Yes, I am.  2 No, I'm not.

Q-4) <Educational background>
What is the most recent education you have received?
1 Elementary school, 2 Junior high school, 3 High school (Technical school), 4 University (Junior college), 5 Graduate school

Q-5) <Religious affiliation>
Are you religious?
1 Yes, I am.  2 No, I'm not.

Q-6) <Accurate sex education>
Do you think that your sex education was accurate?
1 Yes I do.  2 No, I don't.

Q-7) <Sufficient sex education>
Do you think that your sex education was sufficient?
1 Yes, I do.  2 No, I don't.

Q-8) <Hypertension or cardiovascular disease>
Do you have hypertension or cardiovascular disease?
1 Yes, I do.  2 No, I don't.

Q-9) <Diabetes>
Do you have diabetes?
1 Yes, I do.  2 No, I don't.

Q-10) <Gynecological problems>
Do you have gynecological problems?
1 Yes, I do.  2 No, I don't.

Q-11) <Living separately from partner (for job purposes)>
Do you live separately from your partner because of work, etc.?
1 Yes, I do. 2 No, I don't. 3 I don't have a partner.

Q-12) <Sexual activity with partner>
Are you sexually active with your partner?
1 Yes, I am. 2 No, I'm not. 3 I don't have a partner.

Q-13) <Frustration about partner's ED>
Do you sometimes feel frustrated that your partner has ED?
1 Yes, I do. 2 No, I don't. 3 I don't have a partner.

Q-14) <Importance of sexual relationship with partner>
Is sex an important part of your relationship?
1 Yes, it is. 2 No, it isn't.

Q-15) <Importance of sexual relationship, even if ED drugs are used>
Is sex important enough for you to use ED drugs (e.g. Viagra®)?
1 Yes, it is. 2 No, it isn't

Q-16) <Hesitation admitting partner’s ED if sexual life fails>
If ED was affecting sex with your partner, would you hesitate in admitting this to yourself?
1 Yes, I would. 2 No, I wouldn't.
Concerns affecting image of ED drugs

Q-17) Image of ED drugs circulating on the black market
Is your image of ED drugs (e.g. Viagra®) affected because they are sold on the black market?
1 Yes, it is.  2 No, it isn't.

Q-18) Suspicion of partner using ED drugs with other women
Is your image of ED drugs (e.g. Viagra®) affected by the idea that your partner may use them with other women?
1 Yes, it is.  2 No it isn't.

Q-19) Worry about unfavorable consequences of ED drug use
Is your image of ED drugs (e.g. Viagra®) affected by a belief that if you use them, it may lead to something frightening?
1 Yes, it is.  2 No it isn't.

Q-20) Lack of information about ED drugs
Does a lack of information on ED drugs (e.g. Viagra®) affect your image of them?
1 Yes, it does.  2 No, it doesn't.

Q-21) Advertisement of ED drugs by pharmaceutical companies
Do the ways pharmaceutical companies promote or advertise ED drugs (e.g. Viagra®) affect your image of them?
1 Yes, they do.  2 No, they don't.

Q-22) <Price of ED drugs>
Does the price of ED drugs (e.g. Viagra®) affect your image of them?
1 Yes, it does.  2 No, it doesn't.

Q-23) <Side effects of ED drugs>
Do the possible side effects of ED drugs (e.g. Viagra®) affect your image of them?
1 Yes, they do.  2 No, they don't.

Q-24) <Adverse effects of ED drugs on women>
Is your image of ED drugs (e.g. Viagra®) affected by a belief that they may have an adverse effect on women?
1 Yes, it is.  2 No, it isn't.

Q-25) <Impression of ED itself>
Does your impression of ED affect the image you have of ED drugs (e.g. Viagra®)?
1 Yes, it does.  2 No, it doesn't.

<ED drug-related perceptions>
Q-26) <Acceptance of partner's use of ED drugs if convinced of their safety and effectiveness>
If you were convinced of the safety and effectiveness of ED drugs (e.g. Viagra®), would you consider allowing your partner to take them?
1 Yes, I would.  2 No, I wouldn't.

Q-27) <Acceptance of partner’s use of ED drugs if convinced they would improve quality of life>
If you were convinced that ED drugs (e.g. Viagra®) improved your quality of life, would you consider allowing your partner to take them?
1 Yes, I would.  2 No, I wouldn't.

<Attitude toward sexual information media>
Q-28) <Unfavorable opinion of advertisements for ED drugs in newspapers or on television>
Would you find it inappropriate to see advertisements or commercial messages for ED drugs (e.g. Viagra®) in a newspaper or on television?
1 Yes, I would.  2 No I wouldn't.

Q-29) <Unfavorable opinion of advertisements for ED drugs in magazines and weekly publications for adults>
Would you find it inappropriate to see advertisements or commercial messages for ED drugs (e.g. Viagra®) in adult magazines or weekly magazines?
1 Yes, I would.  2 No, I wouldn't.

Q-30) <Sources of sexual information>
Where did you get most of your information about sex from?
1 School, 2 Friends/Acquaintances, 3 Family/Relatives,
4 Magazines/Weekly magazines, 5 Books, 6 Newspapers/Advertisements,
7 Television/Radio, 8 Internet