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SUBJECT AREAS:

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Sexual Satisfaction of infertile couples assessed using the Golombok-Rust Inventory of Sexual Satisfaction (GRISS)

Mayumi Shoji¹, Toshio Hamatani¹, Shoko Ishikawa^{2,3}, Naoaki Kuji¹, Hiroaki Ohta⁴, Hideo Matsui² & Yasunori Yoshimura¹

¹Department of Obstetrics and Gynaecology, Keio University School of Medicine, 35 Shinanomachi Shinjuku-ku, Tokyo 160-8582, Japan, ²Department of Obstetrics and Gynaecology, Tokyo Women's Medical University, 8-1 Kawadacho Shinjuku-ku, Tokyo 162-8666, Japan, ³Ginza Ladies Clinic Institute for Reproductive Medicine, 4-6-11 Ginza Chuo-ku, Tokyo 104-0045, Japan, ⁴Women's Medical Centre of Sanno Medical Centre, 8-5-35 Akasaka Minato-ku, Tokyo 107-0052, Japan.

Received
10 January 2014Accepted
19 May 2014Published
6 June 2014Correspondence and
requests for materials
should be addressed to
T.H. (toshiohamatani@
z3.keio.jp)

Recently, infertility treatment-related psychological effects are receiving increased attention. However, whether sexual satisfaction is reduced amongst infertile couples remains to be elucidated. In this study, sexual satisfaction of Japanese infertile couples was assessed using a validated questionnaire designed to assess the male and female partner individually, and the couple as a whole for the first time. This study randomly included 170 infertile couples seen at the outpatient clinic and 170 couples that had recently achieved spontaneous pregnancy. All couples were given the Japanese version of the Golombok-Rust Inventory of Sexual Satisfaction (GRISS). In couples aged 35 years or older, the male partners showed significantly worse sexual satisfaction scores than the female partners. Sexual satisfaction also deteriorated with therapeutic interventions, with mental factors affected more than physical factors. Therapeutic interventions such as timed sexual intercourse and assisted reproductive technology were considered emotionally stressful for infertile couples, with sexual satisfaction accordingly lower in this group than in couples achieving spontaneous pregnancy. GRISS successfully evaluated lower sexual satisfaction associated with infertility, and hence is a useful tool for identifying couples whose sexual satisfaction could be enhanced by counselling or other stress-reduction modalities.

Sexual satisfaction is an integral part of life and human wellbeing. Therapeutic interventions to improve the chance of conceiving such as timed sexual intercourse and assisted reproductive technology are considered emotionally stressful for infertile couples¹. Psychiatric morbidity has previously shown a significant association with the number of treatment cycles². Furthermore, stressed couples were found to be less fertile, while infertile couples gave higher scores on depression and anxiety scales^{3,4}. Psychological stress has been associated with lower pregnancy rates and a lower success rate of in vitro fertilization and embryo transfer⁵. However, whether sexual satisfaction is less amongst infertile couples than amongst couples who achieved a recent spontaneous pregnancy remains to be elucidated.

This study aimed to elucidate the sexual satisfaction characteristics of Japanese infertile couples for the first time using a validated self-administered structured questionnaire, the Japanese version of the Golombok-Rust Inventory of Sexual Satisfaction (GRISS)⁶. This assessment tool was designed to assess the sexual satisfaction of male and female partners individually and of the couple as a whole.

Results

In total, 93 of the 170 infertile couples (response rate, 54.7%) and 92 of the 170 pregnant couples (response rate, 54.1%) completed and returned the study questionnaire. Table 1 summarises the clinical characteristics of the study subjects. Because couples in the infertile group were significantly older for both men and women, had longer relationships and longer-lasting marriages than those in the pregnancy group, the two groups were compared according to age group.

Deterioration of the overall score. The overall GRISS score showed a moderate tendency to deteriorate with age (correlation coefficient (r) = 0.447 in men, 0.391 in women) (Figure 1). It also deteriorated with the length of relationship (r = 0.450 in men, 0.395 in women) and the length of marriage (r = 0.514 in men, 0.461 in women).



Table 1 | Clinical characteristics of subjects

Characteristic			Infertile (n = 93)	Pregnant (n = 92)	P
Age (years)	Men	Mean ± SD (range)	38.1 ± 5.2 (26–48)	35.5 ± 5.3 (25–47)	< 0.01
	Women		36.6 ± 4.8 (25–45)	33.5 ± 4.4 (25–43)	< 0.01
	25–29	Mean ± SD (n)	26.6 ± 1.3 (5)	27.2 ± 1.3 (18)	ns
	30–34		31.8 ± 1.4 (26)	31.9 ± 1.4 (34)	ns
	35–39		37.2 ± 1.3 (36)	36.8 ± 1.5 (31)	ns
	40–45		42.4 ± 1.5 (26)	41.0 ± 1.2 (9)	ns
Relationship (months)		Mean ± SD (range)	92.7 ± 54.1 (11–216)	54.8 ± 40.3 (4–217)	< 0.01
Marriage (months)			62.3 ± 45.6 (4–192)	27.4 ± 31.7 (0–160)	< 0.01
Attempting to conceive (months)			40.0 ± 31.9 (4–180)	14.3 ± 22.0 (0–148)	< 0.01
Infertility treatment		n (%)			
None			18 (19.4%)	92 (100%)	
Timed sexual intercourse			64 (68.8%)	0	
IUI			34 (36.6%)	0	
ART (IVF-ET, ICSI)			26 (28.0%)	0	

IUI: intrauterine insemination, ART: artificial reproductive technology, IVF-ET: in vitro fertilization and embryo transfer, ICSI: intracytoplasmic sperm injection. n: number; ns: not significant. P values were calculated using the Mann-Whitney U test; differences with a P value < 0.05 were considered significant.

Proportion of low sexual satisfaction (overall score ≥ 5). The sexual satisfaction of male partners was significantly lower than that of female partners in those aged 30 years or older. There was marked deterioration in overall scores for men aged 35 years or older, and the difference between men and women also tended to increase with age (18.2% vs. 8.8% in 30- to 34-year-old pregnant couples; 19.2% vs. 11.5% in 30- to 34-year-old infertile couples; 65.5% vs. 12.5% in 35- to 39-year-old pregnant couples; 75.5% vs. 16.7% in 35- to 39-year-old infertile couples; 55.6% vs. 22.2% in 40- to 45-year-old pregnant couples; and 80.8% vs. 23.1% in 40- to 45-year-old infertile couples) (Figure 2). Thus, the infertile group had significantly worse overall scores in men aged 35 years or older than the group who achieved pregnancy (73.5% vs. 65.5%, $P < 0.05$ in 35- to 39-year-old men; 80.8% vs. 55.6%, $P < 0.01$ in 40- to 45-year-old men) (Figure 2).

Impact of therapeutic interventions on sexual satisfaction. Couples who started therapeutic interventions such as timed sexual intercourse, intrauterine insemination (IUI), and in vitro fertilization and embryo transfer (IVF-ET) showed significantly worse overall scores ($P < 0.0001$ in men, $P = 0.0004$ in women), and the interventions significantly affected infrequency ($P < 0.0001$), non-sensuality ($P = 0.0023$ in men, $P < 0.0001$ in women), non-communication ($P = 0.02$), male dissatisfaction ($P = 0.026$) and male avoidance ($P = 0.048$). On the other hand, physical factors, such as impotence,

premature ejaculation, vaginismus and anorgasmia were not significantly affected in either group (Figure 3).

Subscales showing the strongest correlation with deterioration of overall score. To clarify which subscales were most closely associated with low sexual satisfaction, we assessed the correlation between deterioration of the overall score and each subscale. In male partners, impotence ($r = 0.778$) showed the strongest correlation with deterioration of the overall score, while in female partners, it was non-sensuality ($r = 0.722$). In men and women, the subscales of infrequency ($r = 0.710$ in men, 0.629 in women) and non-communication ($r = 0.661$ in men, 0.656 in women) showed the strongest correlation. Furthermore, male avoidance ($r = 0.627$) and vaginismus ($r = 0.625$) were strongly correlated with deterioration of the overall score in men, whereas vaginismus ($r = 0.607$) and anorgasmia ($r = 0.605$) were strongly correlated with deterioration of the overall score in women. In addition, premature ejaculation ($r = 0.509$), male non-sensuality ($r = 0.501$) and female non-sensuality ($r = 0.501$) were moderately correlated with deterioration of the overall score in men, whereas impotence ($r = 0.551$) was moderately correlated with deterioration of the overall score in women.

Discussion

To our knowledge, this is the first study to assess sexual satisfaction characteristics of Japanese infertile couples using a validated, self-

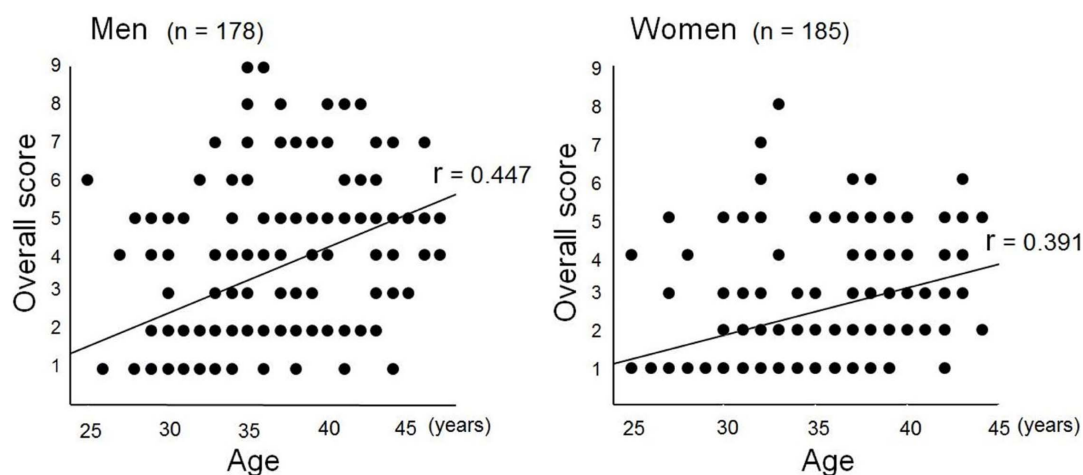


Figure 1 | Deterioration of overall score with age (r : Spearman's rank correlation coefficient). The GRISS overall score scale in which a higher score indicates greater sexual dysfunction indicated a moderate tendency to deteriorate with subject age ($r = 0.447$ in men, 0.391 in women).

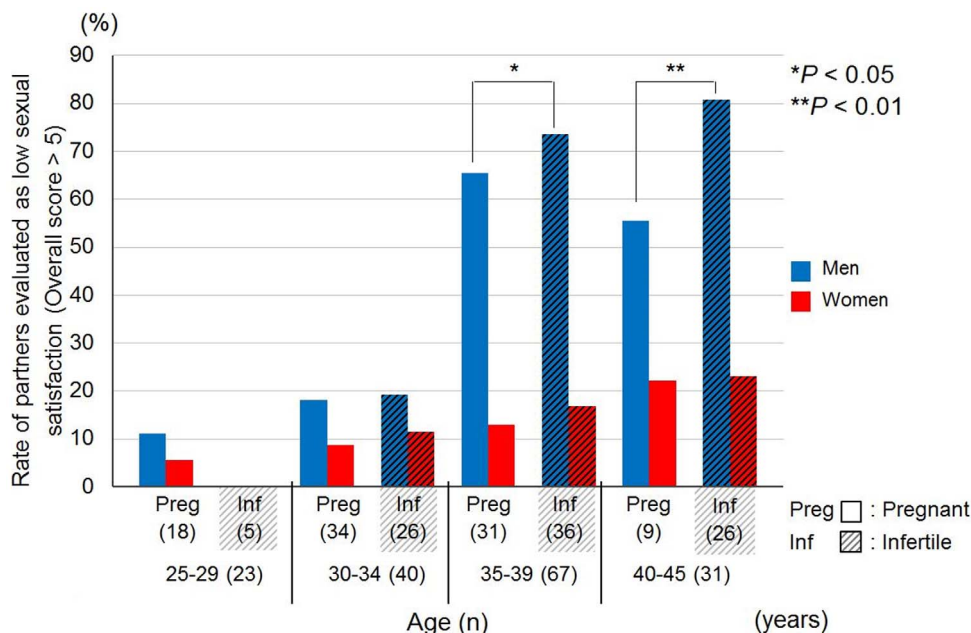


Figure 2 | Proportion of low sexual satisfaction (overall score ≥ 5). The sexual satisfaction of male partners was significantly lower than that of female partners in those aged 30 years or older. There was marked deterioration in the overall score for sexual satisfaction in men aged 35 years or older, and the differences in overall score between men and women also tended to increase with age. Men aged 35 years or older in the infertile group had significantly worse overall sexual satisfaction scores than men in the pregnancy group. *P* values were calculated using the Mann-Whitney U-test; differences with a *P* value < 0.05 were considered significant. Y-axis: Percentage of subjects in each group with an overall score of 5 or higher.

administered, structured questionnaire. The GRISS scores successfully associated reduced sexual satisfaction with infertility in the cohort assessed by questionnaire. In both infertile and pregnant couples, the overall score of sexual satisfaction showed a moderate tendency to deteriorate with age, length of relationship and length of marriage. Such a trend is generally associated with the increasing involvement of women in the workforce and consequent trend toward planned pregnancy, which has contributed to couples postponing reproductive attempts into their 30s and 40s⁷. Moreover, older couples statistically take a longer period to achieve pregnancy than younger couples⁸, further contributing to a vicious circle.

In couples aged 35 years and older, which is the main age group of couples seen for infertility treatment, male partners showed significantly worse sexual satisfaction scores than their female partners, and these differences between men and women also tended to increase with age. These findings contrast to those of previous reports that infertile wives perceived their fertility problem as highly more stressful than their husbands⁹, and that infertility is more stressful for women than for men¹⁰. However, this study did find that mental factors were more affected than physical factors with therapeutic interventions, and deterioration of the overall score in female partners showed the strongest correlation with infrequency,

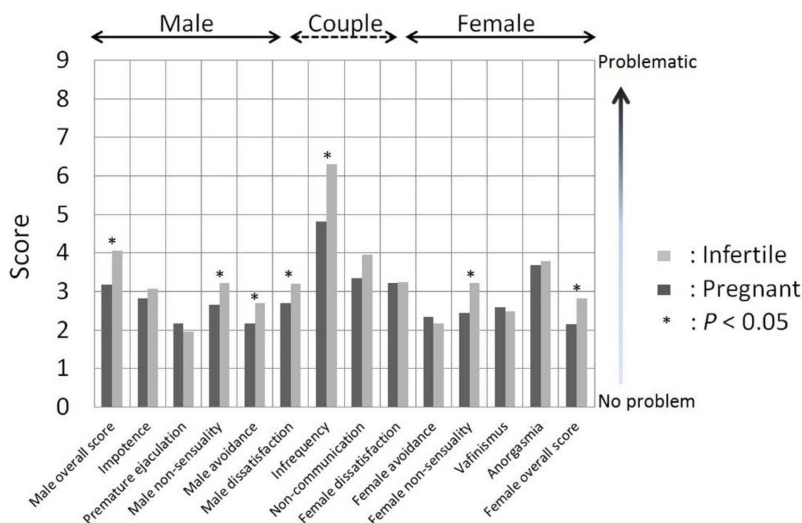


Figure 3 | Impact of therapeutic interventions on sexual satisfaction. Couples who started therapeutic interventions such as timed sexual intercourse, intrauterine insemination (IUI), in vitro fertilization and embryo transfer (IVF-ET) showed significantly worse overall scores (*P* < 0.0001 in men, *P* = 0.0004 in women). In addition, the interventions significantly affected infrequency (*P* < 0.0001), non-sensuality (*P* = 0.0023 in men, *P* < 0.0001 in women), non-communication (*P* = 0.02), male dissatisfaction (*P* = 0.026), and male avoidance (*P* = 0.048). *P* values were calculated using the Mann-Whitney U-test and differences with a *P* value < 0.05 were considered significant.



non-sensuality and non-communication, whereas in male partners the strongest correlation was with impotence. The present results thus indicated that sexual satisfaction is worse in male partners compared to female partners when the couples were assessed as a whole, and with mental and physical factors taken into consideration.

The deterioration in sexual satisfaction of male partners could also be explained by traditional social patterns whereby Japanese male partners tend not to express feelings openly^{11,12}, or by the use of more invasive and stressful assisted reproductive technologies such as intracytoplasmic sperm injection (ICSI) from the start of treatment if the male partner is diagnosed as subfertile¹³. On the other hand, Pal and Santoro¹⁴ implicated the age of male partners as a contributing factor, stating that “despite the decline in semen parameters and sexual performance with aging, this does not appear to have a major effect on the eventual fertility of the aging couple.”

Providing couples with counselling may contribute to enhanced sexual satisfaction and hence result in better fertility. Indeed, Merari et al.¹⁵ suggested a link between anxiety–depression dynamics involving the hypothalamic–pituitary–adrenal axis (HPA) and failure to conceive, and proposed that psychological interventions aimed at reducing anxiety might increase the likelihood of conception. However, the directionality between HPA dysregulation and pre-conception stress or risk of infertility is still unclear¹⁶. Likewise, Tarlatzis et al.¹⁷ indicated that psychological counselling and supportive psychotherapy have been very effective in reducing high levels of anxiety in couples undergoing different reproductive treatments. Moreover, there is a wealth of information available regarding effective stress-reduction modalities such as yoga, meditation and mindfulness that demonstrably alleviated stress in studies of other health outcomes^{18–20}. Another concern is that the response rate in this study was not high (54.7% or 54.1%). However, we must bear in mind that such studies can underestimate infertility treatment-related psychological effects because infertile couples suffering from severely deteriorated sexual relationships might not be totally cooperative towards questionnaires such as GRISS. Further investigation is therefore required to clarify a possible causal relationship between infertility treatment-related psychological effects and sexual dysfunction or dissatisfaction. In conclusion, our present use of GRISS successfully evaluated sexual satisfaction deteriorating with infertility, and hence is a useful tool for identifying couples whose sexual satisfaction might be enhanced by counselling or other stress-reduction modalities.

Methods

Subjects. Infertile couples (n = 170) and couples with a recent spontaneous pregnancy (control; n = 170) consecutively seen at the outpatient clinics of Tokyo Women’s Medical University were randomly included in the study. All enrolled couples were given a self-administered structured questionnaire (GRISS) to be returned either by post or at their next outpatient visit. This study was approved by the Institutional review board of Tokyo Women’s Medical University, and carried out in accordance with the Ethical Guidelines for Clinical Studies established by Japan Ministry of Health, Labour and Welfare. Written informed consent was obtained from all subjects before commencing the study.

Assessment measures. The GRISS questionnaire was designed in 1983 to assess the existence and severity of sexual problems of heterosexual couples or individuals in a heterosexual relationship⁶. A Japanese version of GRISS is in the process of development, linguistic validation, and the first stage of the recommended procedure for cultural adaptation²¹. After conceptual analysis, forward translation, backward translation, and comparison of the backward translation with the English version, a pilot study was conducted²¹.

Although there are many questionnaires validated and used in clinical studies on sexual satisfaction, we selected a questionnaire that 1) assesses male and female individual factors, and the factors between the partners in a couple, 2) evaluates mental and physical factors, 3) does not include items on drug use or homosexuality, 4) includes only multiple-choice, but free-response, items, so that it is quick and easy to answer, and 5) does not particularly define the reference period as past 7 days or 4 weeks. There are two versions of GRISS, one for women and one for men. Each version consists of 28 short items with a 5-point response format.

GRISS provides the overall scores and subscale scores of infrequency, non-communication, dissatisfaction, avoidance, non-sensuality, impotence [men], premature

ejaculation [men], anorgasmia [women], and vaginismus [women]. All scores are converted to a scale (1 to 9), in which a higher score indicates greater sexual dysfunction. The construction has allowed for non-problematic variation between scale points 1 and 4.

Statistical analysis. Spearman’s rank correlation coefficient was used to analyse bivariate association in this study and the Mann–Whitney U test was used to analyse group comparisons. Differences with a *P* value < 0.05 were considered statistically significant. Analyses were performed using SPSS version 13.0.

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Acknowledgments

We greatly appreciate Professor Suzan Golombok of London University (incumbent: Centre for Family Research in the University of Cambridge) for invaluable advice and providing the GRISS, Associate Professor Raoul Breugelmans of the Department of International Medical Communications of Tokyo Medical University for editing the manuscript, and Ms. Yukiko Tashiro and Ms. Hiroe Sakanaka for data collection.

Author contributions

M.S., T.H. and S.I. contributed to the experimental design, data acquisition, data analysis and interpretation, and to drafting of the article. N.K., H.O., H.M. and Y.Y. assisted with experimental design as well as data analysis and interpretation. All authors examined the data and approved the final manuscript.



Additional information

Competing financial interests: The authors declare no competing financial interests.

How to cite this article: Shoji, M. *et al.* Sexual Satisfaction of infertile couples assessed using the Golombok-Rust Inventory of Sexual Satisfaction (GRISS). *Sci. Rep.* 4, 5203; DOI:10.1038/srep05203 (2014).



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