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ORIGINAL PAPER

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INSTRUMENTS OF HIGH RISK SEXUAL BEHAVIOR ASSESSMENT: A SYSTEMATIC REVIEW

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Background: Sexual behavior is a complex activity affecting all aspects of human's life. Risky sexual behaviors impose negative outcomes on family, relationships and health. Unsafe sex is the second most leading cause of disability adjusted life years worldwide. Valid and reliable tools for assessment of risky sexual behaviors are necessary for implementing preventive measures.

Methods: we searched Medline and the Cochrane Library of Systematic Reviews, with the keywords of "risky sexual behavior assessment", "sexual risk assessment", "high risk sexual behavior", "sexual risk taking". By reviewing references of the articles, some complementary studies were added. **Results:** Assessment can be performed by questionnaire or non-questionnaire instruments. Questionnaires vary depending on their target population, evaluation of risky sexual behavior as a whole or focusing on an associated risk factor. In order to avoid usual biases in self reports, objective biomarker assessment of unprotected sex are employed. These markers include prostate specific antigen, chromosome Y DNA and Seminogelin. **Conclusion:** Risky sexual behavior can be assessed by various subjective and objective methods. While self-reports are more feasible, objective methods offer a higher degree of reliability. Further studies for finding more feasible methods of using biomarkers are recommended.

Key words: Sexual behavior, risk taking, risk assessment, prostate-specific antigen, hypersexuality.

1. INTRODUCTION

Sexual behavior is a complex private activity, being subject to social, cultural, moral and legal issues. Academic research into sexual behaviors was commenced in 18th century and has used different strategies including medical, psychiatric and anthropologic methods over years. But public attention to this field was largely drawn after increasing awareness about HIV risk in 90s (1).

Since scientists and health policy makers felt the need to find a way for predicting the future path of HIV epidemic. Although not one single definition for risky sexual behavior is agreed by all health entities, usually risky sexual behaviors are considered as a sexual behaviors that increase the chance of a negative outcome. The negative consequences may include family conflicts, damage to relationships, legal disputes and even financial problems. In literature the negative outcome is defined by the author based on his research purposes which usually is sexual diseases and sometimes unwanted pregnancy. Overall definition of risky sexual behavior is in close relation with dynamic transmission of sexually transmitted infections (STI) (2).

In addition to above mentioned role in getting sexually transmitted diseases, risky sexual behaviors may have a role in various cancers such as head and neck cancer (3), cervical

, vulval, vaginal, anal, oral, and prostate cancer (4, 5). Altogether unsafe sex is the second leading cause of global burden of diseases (6.3%) (6).

Sexual risk is not a simple phenomenon with few determinants that easily lends itself to evaluation. It is shown that interpersonal, social and economic factors can influence the prevalence of risky sexual behaviors in different situations. Also involving of more than one person in nature of sexual act further complicates the assessment and intervention programs regarding risky sexual behaviors (7-10).

However it cannot be ignored that many conditions involving only one person can aggravate getting through risky sexual behavior such as hyper sexuality disorder. Considering all the risks imposed by sexual behaviors, some behaviors are often categorized as risky in sexual health researches.

These include but are not limited to more than one sexual partner, sex under the influence of alcohol and drugs, unprotected sexual intercourse, early debut in sexual activities (11-13).

Developing valid reliable tools for assessing risky sexual behaviors and its elements is of paramount consideration for putting an end to increasing sexual health problems. We investigated the tools for assessing risky sexual behavior in two different categories: Questionnaire and non-questionnaire.

2. METHODS

We searched Medline and The Cochrane Library of Systematic Reviews, with the keywords of “risky sexual behavior assessment”, “sexual risk assessment”, “high risk sexual behavior”, “sexual risk taking”. By reviewing references of the articles, some complementary studies were added. Articles were selected if they dealt with assessment of different aspects of risky sexual behaviors and predisposing factors.

At first two authors screened titles and abstracts, then we obtained the full texts of all selected articles that seemed relevant to our review. Eventually, we scrutinized the full texts for selecting final resources.

3. RESULTS

3.1. Assessment by questionnaires

a) Large general population comprehensive questionnaires

These surveys can provide a good estimation of prevalence of risky sexual behavior and influencing factors in society. Advantages of these large surveys include possibility of identifying and predicting trend of society mentality during time with repeated measures. Due to widespread use and large funding for development and implantation of these questionnaires, reliability and validity is ensured. So questions of these surveys can be used for designing smaller specific questionnaires (14).

NATSAL: National Survey of Sexual Attitudes and Lifestyle

Natsal is the largest valid questionnaire addressing sexual behaviors in the world. This survey is held around each 10 years in Britain. Results are published for further use of researchers and necessary changes and updates are made for the following version. Last version, Natsal 3, was held in 2012. Natsal 3 employs both questionnaire and non questionnaire tools to enhance its validity. In addition to sexual health, Natsal also addresses sexual function and various predisposing factors. Age range of respondents in Natsal 3 is between 44 to 74 years. For Natsal 3, two papers are published explaining the steps for ensuring the reliability and representativeness of this survey (15, 16). In questionnaire part, very large range of questions about sexual behaviors are asked, which include but are not limited to learning about sex, number of sexual partners in different time periods, paying for sex and attitudes toward different kind of sexual relationships. In non-questionnaire part, a urine sample was obtained to test for a wide range of sexually transmitted diseases including chlamydia trachomatis, neisseria gonorrhoea, type specific human papilloma virus, HIV and mycoplasma genitalium. Also a saliva sample was used to evaluate testosterone level. A qualitative part was added in this version for the first time which tries to probe importance and motivation of some sexual behavior. This part is carried out by return visit from those who participate in specific sexual activity of researcher interest. To individual based interview, a smaller version was conducted online to pave the way for future web based design of this questionnaire (17).

YRBSS: (Youth Risk Behavior Surveillance Survey)

This questionnaire addresses six type of health risk behaviors, one of which is risky sexual behaviors that contribute to sexually transmitted infections including HIV and unintended pregnancy. This survey is held every other year in schools in 9th through 12th grade in US. This is a 89

item questionnaire and directly addresses health related behaviors. 9 items of YRBSS are about risky sexual behavior. Questions of YRBSS are developed based on most common causes of death in this age group. Large scale studies have been carried out on questions of YRBSS by center of disease control, and questions with low kappa are replaced (18, 19). Final version is 2013 version which reflect changes made to primary versions based on studies and expert opinions (20). An study confirmed the comparable reliability of the questionnaire when done in an online format (21).

b) Small population questionnaires risky sexual behaviors and predisposing factors

Questionnaire usually ask directly about risky sexual behaviors such as unprotected sex or number of sexual partners. Some of them address intent, impulsivity and perceived attitudes toward sexually related subjects. Multiple sub factors are developed for each questionnaire that enables researcher to investigate these separately. Some of these address only a single aspect of sexual behavior such as condom use or only a single preventive factor such as communication skills. For measuring reliability of a questionnaires Cronbach’s alpha (internal consistency) is calculated and reported. For employing the questionnaire in clinical context or research purposes, alpha should be at least 0.9 and 0.7 respectively (22, 23).

Sexual Risk Survey (SRS) is developed for measuring risky sexual behavior among college students. This questionnaires assess intent to engage in risky sexual behaviors. SRS emphasizes on some specific aspects of sexual risk taking such as sex with uncommitted partner, impulsive sex and risky anal sex (24).

Safe sex behavior questionnaire (SSBQ) emphasizes on the frequency of taking protective measures by participants. SSBQ is correlated with general risk taking and general assertiveness as an evidence of it’s construct validity (25).

Two measures of Sexual Health Practices Self-Efficacy Scale (26) and Sexual Risk Behavior Beliefs and Self Efficacy Scales (SRBBS) (27) employ a concept called self efficacy for assessing sexual behavior. Self efficacy was first introduced by Bandura (28), and is defined by a person’s belief in his capacity to perform a behavior successfully. Self efficacy is believed to be one of the most important prerequisite for behavioral changes. This concept should be taken into consideration in evaluation of any educational intervention for changing health related behaviors (29, 30). Measures of self efficacy are shown to be related to outcomes in many other health related contexts such hypertension, asthma, diabetes, pain management, depression and medication adherence (31). Those who use condom consistently had more positive norms and attitudes toward condom use and higher self efficacy for communication and using condoms and fewer perceived barriers to condom use. Consistent use of male latex condom is one of the most effective measures for reducing the risk of many STIs including HIV. The protection rate is not 100% for some other STIs (32-34). In addition to inconsistent condom use, it is shown that reporting condom failure is significantly associated with sexually transmitted infections (35). Condom failure typically occurs due to user error, this shows the importance of accuracy in condom use in addition to consistency. Using questionnaires for identifying common user errors can be a commencing point for designing influential

Name of questionnaire	Date of first conduction	Items of questionnaires	Non questionnaire part
NATSAL	Since 1990 , around each ten years.	Sexual health related behaviors and determinants	- biologic tests - qualitative part
YRBS	Since 1991 , every odd year	Directly focusing on health related behavior – No determinants such as knowledge , attitude , believes	none

Table 1. Large general population comprehensive questionnaires assessing sexual behaviors

Name	Items - Factors	Psychometric evaluation
Sexual Risk Survey (SRS)	23 items – 5 factors of Sexual Risk Taking with Uncommitted Partners , Risky Sex Acts , Impulsive Sexual Behaviors , Intent to Engage in Risky Sexual Behaviors , and Risky Anal Sex Acts	Total : 0.88 Alpha of factors between : 0.61 to 0.93 Test re test reliability : 0.93
Safe Sex Behavior Questionnaire (SSBQ)	27 items – 4 factors of protection during intercourse, avoidance of risky behaviors, avoidance of bodily fluids, and interpersonal skills	Total : 0.82 Alpha for factors between : 0.52 to 0.85 Content validity index : 0.98
Sexual Health Practices Self-Efficacy Scale	20 items – 6 factors of sexual relationships, sexual health care , sexual assault , safer sex , sexual equality/diversity , abstinence	Alpha of factors respectively are : 0.82 , 0.81 , 0.78 , 0.71 , 0.73
Sexual Risk Behavior Beliefs and Self Efficacy Scales (SRBBS)	26 items- Sexual risk behavior : 3 factors of Norms about sexual intercourse , Attitudes about sexual intercourse , Self efficacy in refusing sex Protective behaviors : 5 factors of Norms about condom use, attitudes about condom use , self efficacy in communication , self efficacy in using condoms, barriers to condom use	Alpha of factors respectively are : 0.78 , 0.78 , 0.70 , 0.84 , 0.87 , 0.66, 0.61, 0.73
Condom use errors / Problem survey (CUES)	16 items- Assessments of most common problem and errors in condom use in 3 last experiences	Not reported due to asking about real experience
Correct Condom Use Self Efficacy Scale (CCUSS)	7 item questionnaire about errors and problems that might occur before , during and after sex	Alpha : 0.70
UCLA Multidimensional Condom Attitudes Scale (MCAS)	25 items. 5 factors of reliability and effectiveness of condoms , pleasure associated with condoms, stigma associated with condoms, embarrassment about negotiation and use of condoms, embarrassment about purchasing condoms	Alpha between 0.71 to 0.94 for subfactors (reported separately for each sex)
Hypersexual Behavior Inventory (HBI)	19 items- three factors: control, coping, and consequences.	Total alpha : 0.90 Alpha of factors respectively are 0.78 , 0.86 and 0.78.
Hypersexual Disorder Screening Inventory (HDSI)	7 items - two factors : recurrent and intense sexual fantasies, urges and behaviors , distress and impairment as a result of these fantasies, urges, and behaviors	Alpha : 0.88

Table 2. Small population questionnaires about risky sexual behaviors and predisposing factors

preventive measures (36, 37).

c) Main questionnaires in this field are Condom use errors

Problem survey (CUES) (38, 39), Correct Condom Use Self Efficacy Scale (CCUSS) (40), UCLA Multidimensional Condom Attitudes Scale (MCAS) (41), MCAS has been developed since 2 decades ago and is largely used even in most recent studies. CCUSS is a unique tool that measures a person's perception of difficulty he will face for applying condoms. This questionnaire is correlated with Condom use errors. CUES has two versions. M-CUES and W-CUES which is filled by men and women respectively. In this survey , participant are asked to consider only the last three times that condoms were used.

Hypersexual behavior or hyper sexuality describes any above average sexual activity including fantasies, urges and behaviors (42). Adding the term of hypersexual disorder to DSM V was rejected, need for research on hypersexual behavior was highlighted after proposal to add this disorder. 2 main questionnaires for measuring hypersexuality are hypersexual behavior inventory (43, 44) and hypersexual disorder screening inventory (45).

3.2. Non-questionnaire methods

Current research on risky sexual behavior are highly dependent on self reporting of sexual behaviors despite legitimate concerns about it's validity (46). Some may believe that questionnaires are the only feasible way for assessment

in individual level (47), biological markers of unprotected sex are available.

a) Prostate Specific Antigen (PSA): PSA is an antigen with anti coagulability features, which is secreted into seminal fluid by prostate and enables sperms to move freely. Despite it's name, PSA is not specific to prostate and can be detected in other body fluids such as blood, urine and breast milk. However, due to it's much higher concentration in seminal fluid compared to other sources, detecting PSA in vaginal fluid above a certain threshold is a credible indicator of unprotected sexual intercourse. PSA has been used in forensic rape investigations primarily since many years ago (48). Main problem about PSA is rapid clearance of that from vaginal fluid in an average of 20 to 27 hours (46) which has led to advent of other markers. The assays for PSA are extremely sensitive after insemination, but concentration of PSA decreases rapidly and is back to baseline after 48 hours which seems a short period for doing research. Since PSA in blood is a marker for prostate cancers, applying this assay is feasible and almost available in any laboratory.

b) Y chromosome: Since y chromosome is not found in women, detection of that in vaginal fluid can be a sign of unprotected sex. Y chromosome half life is 3.8 days and can be detected up to 15 days (49). Studies on Y chromosome show that menses have no significant effect on patterns on

this marker (50). In addition in those with proper condom use, no Y chromosome was detected in vaginal fluid (49, 51). Compared to PSA, this marker provides many benefits, assays are more expensive and require more advanced equipment and trained laboratory technicians. Concurrent use of Yc and HIV DNA showed that this marker can validate efficacy of preventive interventions (52).

c) *Seminogelin*: Seminogelins are protein components of the coagulum formed after ejaculation. Major source of this proteins is seminal vesicle (53). Detection of seminogelin in vagina can be a marker of exposure to unprotected source in previous 48 hours (54). Rapid stain identification of human semen (RSID) which detects seminogelin has been used a placebo gel trial in south Africa (55). However, there is lack of data about it's clearance from vaginal fluid which limit it's use as a marker of semen exposure (46).

4. CONCLUSIONS

Risky sexual behaviors are a major cause of burden of disease in world. Due to private and sensitive nature of sexual behaviors, valid reliable assessment is a prominent challenge. Valid reliable questionnaires have been the most widely used tool for gathering data in this field. Some questionnaires are held regularly in big scales to assess the overall situation and trend of a large society like Natsal and YRBS. Researchers are advised to use questions of these large surveys for designing their questionnaires due to assured validity and reliability. Many other questionnaire are developed for assessment of specific risky sexual behaviors and predisposing factors such as sexual risk survey (SRS), safe sex behavior questionnaire (SSBQ), Sexual Health Practices Self-Efficacy Scale, Sexual Risk Behavior Beliefs and Self Efficacy Scales (SRBBS). Consistent correct use of condom has become the core of most educational programs for preventing sexually transmitted infections. 3 questionnaires of Condom use errors / Problem survey (CUES), Correct Condom Use Self Efficacy Scale (CCUSS), UCLA Multidimensional Condom Attitudes Scale (MCAS) explore frequency and accuracy of condom use. Finally, it cannot go unnoticed that hypersexuality is correlated to taking risky sexual behaviors. Recent proposal to include hypersexuality as a disorder in latest version of DSM was rejected. But this proposal has drawn attention to this subject. Two questionnaires of Hypersexual Behavior Inventory (HBI) and Hypersexual Disorder Screening Inventory (HDSI) are used for identifying hypersexuality. Despite large use of self reports studies show major issues in accuracy of these kinds of data. Objective tools for assessment of risky sexual behaviors are becoming more popular. However testing for STIs can depict an overall picture of risky sexual behaviors in society, it cannot be an accurate measure of that especially in individual level. Biological marker for unprotected sexual acts are now being used in sexual behavior research. PSA, chromosome Y DNA and seminogelin are all found in semen and can be used in this regard. PSA has been used in coronary for many years and has a distinctive role for prostate cancer screening.

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script review. Mohammad Arash Ramezani: manuscript editing and review.

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