Sensitivity and Specificity of the Self-Report Adolescent Health Screening Tool in Identifying Mental Health Problems among Adolescents.

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Sensitivity and Specificity of the Self-Report Adolescent Health Screening Tool in Identifying Mental Health Problems among Adolescents.

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Abstract

This study was done to validate the mental health component of the locally used Adolescent Health Screening Form (Borang Saringan Kesihatan Remaja, BSSK/R/1/2008). This screening tool is used at the primary care levels for adolescent clients. The mental health component of this screening tool was used to screen for depression, anxiety and suicidal tendency. Three validated tools was used in the validation process namely: 6-item Kutcher Adolescent Depression Scale: KADS for screening of depression problem, Beck Anxiety Inventory for screening of anxiety problem and Tool for Assessment of Suicide Risk: Adolescent Version (TASRS-A) for screening of suicidal risk.

This Adolescent Health Screening Tool was found to be very sensitive (100%) and specific (79.0%) in detecting anxiety disorders, and very specific (98.8%) but less to moderate sensitivity (28.6% and 54.5% respectively) in detecting depression and suicidal risk.

Introduction

Adolescence is a period of gradual transition from childhood to adulthood. World Health Organization (WHO) defined adolescence as between the ages of 10 and 19 years. This can be further subdivided into 3 categories, namely: early adolescence (10-14 years), middle adolescence (15-17 years) and late adolescence (18-19 years). WHO had noted that lifestyle diseases that are caused by smoking, risky sexual behaviours, alcohol and drug abuse have their roots in adolescence, and are responsible for high morbidity and mortality rates globally.

It was generally accepted that health risks in adolescence are more social in origin than medical, and recognition followed by preventive measures will result in reduction of adolescent mortality and morbidity. However, many studies noted barriers to communication between health care providers and adolescents that prevent adolescents from disclosing relevant information including confidentiality issues. (1,2,3) In 1993, the American Medical Association’s Department of Adolescent Health and the Centers for Disease Control and Prevention developed and promoted the Guidelines for Adolescent Preventive Services (GAPS) which are intended to improve health care delivery for 11- to 21-year-old patients. GAPS has 24 recommendations that consists of health care delivery, health guidance, screening and immunization (4). Screening in the form of surveillance was also conducted by the Centers for Disease Control and Prevention (CDC) through its Youth Risk Behaviour Surveillance System (YRBSS) to monitor six categories of priority health-risk behavior among youth (5). Since then various local adolescent health screening tools were developed such as psychosocial screening using Adolescent Screening Questionnaire (ASQ), by Centre of Adolescent Health, Australia (6) and Self-reported Adolescent Risk Behaviour, by University of Cape Town, South Africa (7). A study evaluating the efficacy of a primary care pre-visit questionnaire had revealed a greater detection of psychosocial issues (8).

In Malaysia, Adolescent Health Screening Form formerly known as Borang Saringan Kesihatan Remaja (SKR) was first developed and pretested in 1998 under two WHO pilot projects in two clinics at Kota Tinggi, Johor (9) and Kuala Trengganu (10). The form was then revised and improved based on the findings of WHO pilot projects by content expert in five main areas namely; nutrition, physical health, mental health, sexual and reproductive health and risky behavior and piloted in the year 2001 involving 173 clinics. In the year 2005 the form was formally used in 418 clinics in Malaysia with a guideline produced to assist in the management of ‘symptomatic’ adolescents (11). Since 2009, the form has been used in all health clinics under Ministry of Health with the implementation of Reviewed Approached at Primary Health Care and known as Adolescent Health Screening Form (Borang Saringan Status Kesihatan Remaja, BSSK/R/1/2008). This study was done as requested by the Family Health and Development Division, Ministry of Health Malaysia, as the data from this tool is currently been collected through regular returns and used as a baseline for planning of
adolescent health intervention program. The aim of this study was to determine the sensitivity and specificity of the Adolescent Health Screening tool in identifying mental health problems among adolescents.

Methodology

This is a cross-sectional study involving 106 adolescents. Sample size was calculated based on the prevalence of mental health problems noted in the 3rd National Health and Morbidity Survey (NHMS III)(12). Based on “Sample Size Calculation for Sensitivity and Specificity Studies(13), to ensure a 99% sensitivity and 95% specificity, with an expected prevalence of psychiatric morbidity of 20%, desired precision of 5.0% and Confidence Interval of 95%, expected sample size was 92. Considering of possibility of 10% no-response rate, required sample size was 120 respondents.

Sample was selected using quota sampling where all respondents who were eligible to be included in the study based on the inclusion criteria and agreed to involve in the study were selected (Figure 1). Research team members decided to only focus on validation of mental health component (C6) as other parts of the screening tool were not suitable for sensitivity and specificity test. As there is no locally validated tool available at the time of the study, the group had selected three validated tools to be used in the validation process namely:

1. 6-item Kutcher Adolescent Depression Scale: KADS(14) for screening of depression problem
2. Beck Anxiety Inventory15,16 for screening of anxiety problem.

The respondents who were recruited from the four identified health clinics (Tanglin Health Clinic, Jinjang Health Clinic, Putrajaya Health Clinic, and Bandar Baru Bangi Health Clinic) were screened for the eligibility by the four Family Medicine Specialists who also act as Co-Investigators cum Data Collectors (Figure 1). To ensure standardization of data collection, Manual for Data Collectors was developed and adhered to. Data collectors also underwent specific training given by the principal investigator and technical advisors.

Validation process involved several steps; filling-up of the self-administered Adolescent Health Screening Forms; followed by self-administered validated screening tools (6-item Kutcher Adolescent Depression Scale: KADS and Beck Anxiety Inventory); followed by interview by Family Medicine Specialist (FMS) to validate suicide risk using Tool for Assessment of Suicide Risk: Adolescent Version (TASR-A). To ensure standardization of interview using TASR-A, the four specialists cum data collectors adhered directly to the manual and interview per verbatim.

For the self-administered Adolescent Health Screening Form, adolescents were coded as having depressive symptoms if they have four out of seven symptoms listed in the screening form (prolonged depressed or ‘down’, insomnia, loss of appetite, loss interest in doing daily activity, burden to others, worthlessness, ‘think about killing yourself’); coded as having anxiety symptoms if positive for statement “anxious or worry most of the time”, positive for risk for suicide if positive for statement “have think about killing yourself”. Ethical issues were handled by protection of respondents’ right to privacy and assurance of confidentiality and anonymity of responses. Medical problems or risk factors identified have been managed accordingly. Adolescents with suspected depression and suicidal ideation were referred to Child and Adolescent Psychiatrist for further management.

Research Proposal was approved by the Medical Research and Ethics Committee, Ministry of HealthMalaysia.

Data quality control was ensured through development of Manual for Data Collectors and ensuring that all data collectors underwent specific training. Findings from the screening form and validated tools were entered into SPSS database manually. Double entry and consistency check was done followed by data cleaning. Syntax for diagnosis based on agreed criteria was done and data analysis was done using SPSS Version 16.0 to look for sensitivity and specificity of the Adolescent Health Screening Form (Borang Saringan Status Kesihatan Remaja, BSSK/R/1/2008).

Results

A total of 106 adolescents were noted as eligible and agreed to involve in this study. By sex, almost equal distribution was noted with 57% females and 43% males. Most of the adolescents (71.7%) were in their mid-adolescence, with 15.5% in early adolescence and the remaining 13.2% were in late adolescence stage (Table 1). More than three quarter of the respondents was Malays (77.4%), with 21.7% Chinese and 0.9% Indian. A small percentage (2.8%) of the respondents had not completed their primary education at the time of the
interview. Majority of them (84.0%) had completed their primary education, with 11.3% had completed secondary education, and 1.9% had completed tertiary education.

Based on the Adolescent Health Screening Form (Borang Saringan Kesihatan Remaja, BSSKR/1/2008), 23 respondents (21.7%) were noted as having anxiety symptoms, 7 respondents (6.6%) had depressive symptoms and another 9 respondents (8.5%) were at risk for suicidal intention.

Symptoms detected using Adolescent Health Screening Form (Borang Saringan Kesihatan Remaja, BSSKR/1/2008), by sociodemographic profiles were shown in Table 2. The percentage of anxiety symptoms, depressive symptoms and suicidal intention was noted as higher among females (25.0%, 6.7% and 10.0% respectively).

The percentage of adolescents with anxiety symptoms was higher among those in mid adolescence (23.7%), while depressive symptoms and suicidal intention were common among Malays (8.5% and 9.8% respectively), while the percentage of adolescents with anxiety symptoms was higher among other ethnic groups (33.3%) as compared to Malays (18.3%).

Table 3 shows comparison between symptoms detected using Adolescent Health Screening Form (Borang Saringan Kesihatan Remaja, BSSKR/1/2008), and problem detected using validated tools. Percentages on respondents with anxiety were noted as lower by using validated tools compared to Adolescent Health Screening Form (Borang Saringan Kesihatan Remaja, BSSKR/1/2008). However, validated tools revealed a higher percentage of respondents with depressive symptoms and risks for suicidal intention.

Based on the above findings, sensitivity, Specificity, Positive Predictive Value (PPV), and Negative Predictive Value (NPV) of Adolescent Health Screening Tool was tabulated in Table 4. Adolescent Health Screening Tool was noted as very sensitive but low PPV in the screening of anxiety symptoms, but less sensitive but very specific and has high PPV, in detecting depressive symptoms and risk for suicidal intention.

Discussion

A good and appropriate screening tool should be developmentally appropriate for adolescents, capable of screening what it is intended for and practical to use in busy outpatient settings. Most of the validity studies published were targeted to screening of specific problems in adolescents such as CRAFT screening (18) and Simple Screening Instrument for Alcohol and Other Drug Abuse (SSI-AOD) (19), for substance abuse screening.

Validation study of risk behavior and health screening tools were mostly done using test-retest reliability study (5,7,16,19). Our validation study was done based on the criterion standard validation study, using similar concept as CRAFT validity study (18) and ASQ validity study (20) which compared with structured clinical interview. Reliability and validity study of two questions in YBRS had also been done in 2000 (21).

A good screening tool must be highly sensitive and specific. High sensitivity but low specificity screening tool will result in high false positive cases, but low sensitivity and highly specific screening tool will not be suitable for mass screening such as in the primary care setting. In the context of our screening tool, it was formed as a first line screening in order to identify health problems among adolescent. Adolescent noted as having any health problem will then be referred to medical doctors for evaluation and further management. Based on this Standard Operating Procedure, this screening tool should be highly sensitive but not necessarily high specificity.

Using Beck Anxiety Inventory (16) as the gold standard, our screening tool was noted as highly sensitive but less likely to correctly identified adolescents with anxiety symptoms (very low PPV). However, this finding should be interpreted with caution as only one adolescent was correctly identified as having anxiety symptoms (true positive case).

Studies had noted other screening methods which were very reliable to screen anxiety in adolescents such as the Multidimensional Anxiety Scale for Children (MASC) (22), Screen for Child Anxiety Related Emotional Disorders (SCARED) (23) and the Spielberger State-Trait Anxiety Inventory (STAI)(24).

At present, there is no screening tool for anxiety that had been translated and validated for Malaysia. In validating the depression component using 6-item Kutcher Adolescent Depression Scale: KADS (14) as the gold standard, our screening tool was found as having very low sensitivity (28.6%) but highly specific (98.8%) with high PPV and NPV. Studies had noted that the point prevalence of depression in adolescent ranged from 1.8% to 9.6% (25,26,27,28) with a life-time prevalence of 11.4% to 33% (28,29). Study on KADS reliability using a prevalence of 10% had noted a sensitivity and specificity of 92% and 71% respectively (14). Guideline for primary care practitioner suggested the use of depression-specific screening tools as diagnostic aids with follow-up clinical interviews (separate interview with other informants, eg, parents and the adolescents) to ensure accurate diagnosis.
and impairment assessment before treatment.(29)
Based on this recommendation, clinical assessment is still required to assess suicidal tendency. Currently at Malaysia, the Malay Version of Children Depression Inventory (CDI) had been validated (Cronbach’s alpha 0.83%) (30). We were unable to use this CDI as the validated tool for our study as it was not yet published at that time.
For suicidal risk, using the Tool for Assessment of Suicide Risk: Adolescent Version (TASRS-A)(17) as the gold standard, our screening tool was noted as moderately sensitive to detect risk for suicidal intention (54.5%), but highly specific (98.8%), with moderate PPV and high NPV. Systematic review of population-based studies on the prevalence of suicidal phenomena in adolescents noted a mean proportion of 9.7% (95% CI: 8.5, 10.9) of adolescents reporting as had attempted suicide at some point in their lives, and 29.9% (95% CI: 26.1, 33.8) of adolescents had thought about suicide at some point (31). NHMS III done in 2006 had noted that the prevalence of acute suicidal ideation among adolescents aged 18 and 19 was 11.4%. (13) Studies had suggested usage of self-administered scales for screening of suicidal ideation as adolescents may disclose information about suicidality on self-report that they might deny in person (32). However, most of the scales for screening tends to be oversensitive and underspecific and lack predictive value. Adolescents who were noted as having suicidal ideation using a screening tool should always be assessed clinically (32). Based on these findings, this sensitivity and specificity study of these three components had noted that questionnaires used in this screening tool were unable to correctly identify adolescents with either anxiety, depressive symptoms or risk for suicidal ideation. It is advisable to revise the mentioned components in order to increase their sensitivity as a screening tool.
This study had several limitations. Researcher was unable to validate every question in the Adolescent Health Screening Tool as some were not suitable for validation. Furthermore, the percentage of mental health morbidity detected in this study did not represent a true picture of the adolescent in Malaysia as the sample was not representative and only from selected adolescents who were well-versed in Bahasa Malaysia and English for validation purposes.

Conclusion

This sensitivity and specificity study using identified validated tools had noted the Adolescent Health Screening Tool to be very sensitive and specific in detecting anxiety symptoms and very specific but less sensitive in detecting depressive symptoms and risk for suicide. Therefore, this tool was able to correctly identify adolescents with anxiety disorders. However, combination with other highly sensitive tools is required to identify depression and suicidal idea as it was unable to correctly identify adolescents with depression and suicidal ideation or intention.

Acknowledgements

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References

13. Sample Size Calculation for Sensitivity and Specificity Studies, by Lin Niang or Mohd Ayub Sadiq, School of Dental Sciences, University of Sciences Malaysia (unpublished)
Illustrations

Illustration 1

Table 1: Sociodemographic profile of the study respondents (n=106)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
</tr>
<tr>
<td>10-14 years</td>
<td>16 (15.1)</td>
</tr>
<tr>
<td>15-17 years</td>
<td>76 (71.7)</td>
</tr>
<tr>
<td>18-19 years</td>
<td>14 (13.2)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46 (43.4)</td>
</tr>
<tr>
<td>Female</td>
<td>60 (56.6)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>82 (77.4)</td>
</tr>
<tr>
<td>Chinese</td>
<td>23 (21.7)</td>
</tr>
<tr>
<td>Indian</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>Highest Level of Education</td>
<td>Count</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Incomplete Primary</td>
<td>3</td>
</tr>
<tr>
<td>Primary education</td>
<td>89</td>
</tr>
<tr>
<td>Secondary education</td>
<td>12</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>2</td>
</tr>
</tbody>
</table>
Illustration 2

Table 2: Percentage of mental health problems detected using Adolescent Health Screening Tool by Sociodemographic profile (n=106).

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
<th>Stage of adolescence</th>
<th>Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (n=46)</td>
<td>Female (n=60)</td>
<td>Early (n=16)</td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>8 (17.4%)</td>
<td>15 (25.0%)</td>
<td>2 (12.5%)</td>
</tr>
<tr>
<td>Depressive</td>
<td>3 (6.5%)</td>
<td>4 (6.7%)</td>
<td>0</td>
</tr>
<tr>
<td>Suicidal intention</td>
<td>3 (6.5%)</td>
<td>6 (10.0%)</td>
<td>0</td>
</tr>
</tbody>
</table>
Illustration 3

Table 3: Percentages of mental health problems detected using Adolescent Health Screening Tool (BSSK/R/1/2008) and validated tools (n=106).

<table>
<thead>
<tr>
<th></th>
<th>BSSK</th>
<th>Validated tools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No (%)</td>
<td>No (%)</td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>23 (21.7%)</td>
<td>1 (0.9%)</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>7 (6.6%)</td>
<td>21 (19.8%)</td>
</tr>
<tr>
<td>Suicidal intention</td>
<td>9 (8.5%)</td>
<td>11 (10.4%)</td>
</tr>
</tbody>
</table>
Illustration 4

Table 4: Sensitivity (Se), Specificity (Sp), Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of BSSK and Validated Tools

<table>
<thead>
<tr>
<th>Variable</th>
<th>Se</th>
<th>Sp</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety symptoms</td>
<td>100%</td>
<td>79.0%</td>
<td>4.3%</td>
<td>100%</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>28.6%</td>
<td>98.8%</td>
<td>85.7%</td>
<td>84.8%</td>
</tr>
<tr>
<td>Suicidal intention</td>
<td>54.5%</td>
<td>98.8%</td>
<td>66.7%</td>
<td>94.8%</td>
</tr>
</tbody>
</table>
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