

図1 SF-36国民標準値との比較—治療前—
* $P < 0.05$, ** $P < 0.01$

本稿では、IBS患者のQOLをポリカルボフィル製剤投与前後において比較検討し、同時に血中H-CRPについて検討することを目的とした。

対 象

Rome II criteriaを用いて診断したIBS患者26名を対象とした。その内訳は下痢型15名(女性7例, 男性8例), 便秘型11名(女性10例, 男性1例)で, 平均年齢52.0歳(27-75歳)であった。

方 法

前記IBS患者に対して, 1,500~3,000mg/dayのポリカルボフィル製剤を8週間投与し, その前後でSF-36質問票の点数を比較した。同時に, 腹痛の程度も評価し, さらに, 血中H-CRPをラテックスネフェロメトリー法を用いて測定した。腹痛の程度は, なし, 軽度: 自制内, 中等度: 日常生活に支障をきたす程度, 高度: 我慢できない程度, と設定した(なし; 0点, 軽度; 1点, 中等度; 2点, 高度; 3点)。下痢型の患者には, 適宜便細菌培養検査を実施し, また, 抗うつ剤や抗不安剤を途中で追加した患者は除外した。

統計学的検討は, 国民標準値との差はz検定を用いて, そのほかの検定はt検定を用いて, $P < 0.05$ 以下を有意差ありとした。

1. SF-36質問票

疾患の種類や年齢などの影響を受けずに, 主観的なQOLの評価を行うことができる質問票で

ある。全体的健康感(GH: general health perception), 身体機能(PF: physical functioning), 日常役割機能—身体(RP: role-physical), 日常役割機能—精神(RE: role-emotional), 社会生活機能(SF: social functioning), 体の痛み(BP: bodily pain), 活力(VT: vitality), 心の健康(MH: mental health)の8下位尺度36項目の質問から構成され, 各下位尺度の素点を0-100点の範囲に変換し, そのスコアが高いほど健康状態が良いとされる。そのうち, 身体的健康度の因子としてGH, PF, RP, BPが, 精神的健康度の因子としてRE, SF, VT, MHが抽出される。

結 果

1. SF-36

国民標準値との差: 8下位尺度すべてにおいて, 患者群は国民標準値より有意に低値を示した。その中で「PF: 身体機能」は比較的国民標準値に近い値を示した(図1)。

下痢型および便秘型における下位尺度得点(治療前): 8下位尺度すべてにおいて下痢型および便秘型のQOLに有意差を認めなかった。

IBS症例の治療前後における下位尺度得点: 「SF: 社会生活機能」, 「VT: 活力」および「MH: 心の健康」において有意にQOLの改善を認めた(図2)。

下痢型における下位尺度得点(治療前後): 「SF: 社会生活機能」および「VT: 活力」において有意に

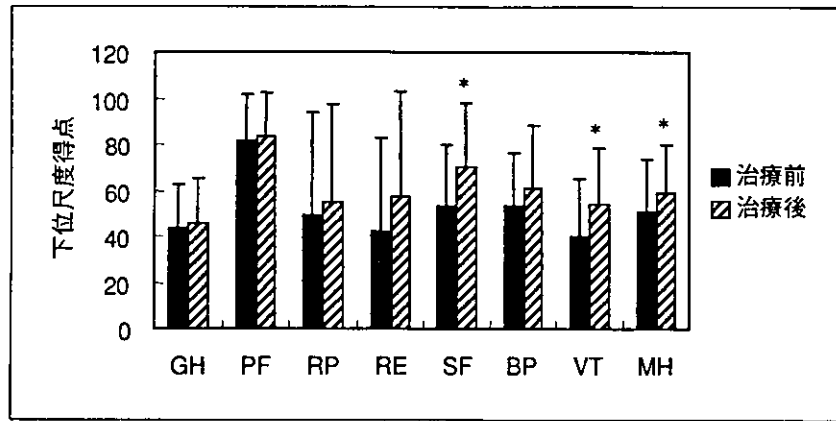


図2 治療前後における下位尺度得点
* P<0.05 vs 治療前

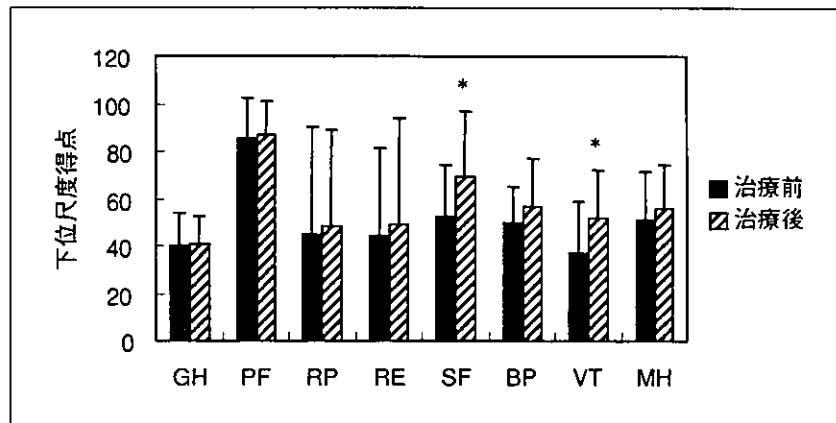


図3 下痢型における下位尺度得点—治療前後—
* P<0.05 vs 治療前

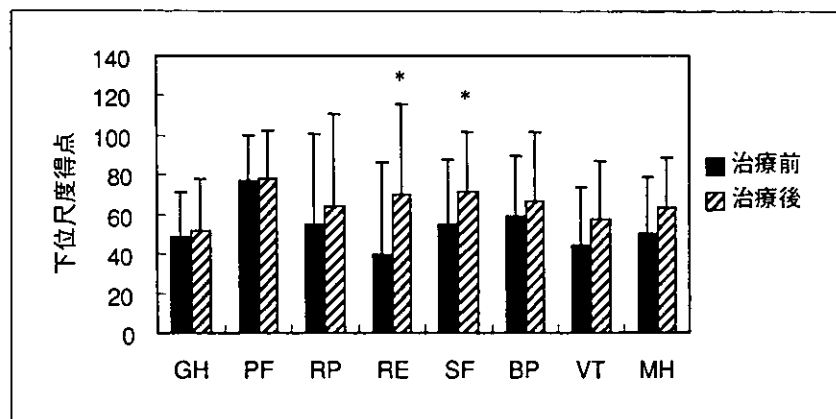


図4 便秘型における下位尺度得点—治療前後—
* P<0.05 vs 治療前

QOLの改善を認めた(図3)。

便秘型における下位尺度得点(治療前後)：「RE：日常役割機能—精神」および「SF：社会生活機能」において有意にQOLの改善を認めた(図4)。

性別における下位尺度得点(治療前後)：女性では「SF：社会生活機能」, 「BP：体の痛み」, 「VT：活力」および「MH：心の健康」において有意にQOLの改善を認め(図5), 男性では「RP：日

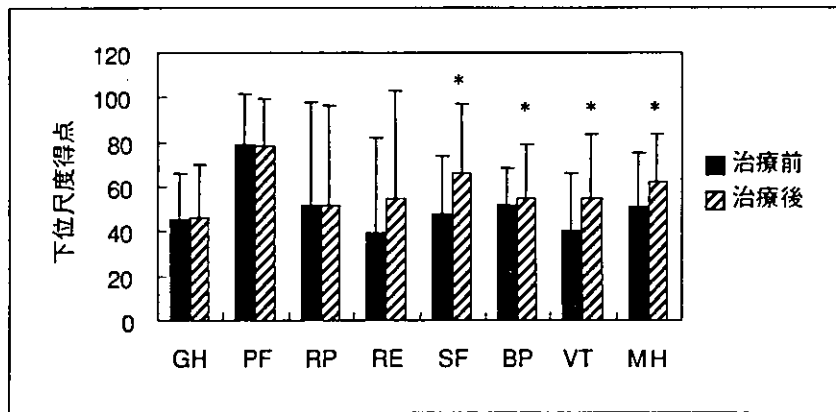


図5 女性における下位尺度得点—治療前後—
* $P < 0.05$ vs 治療前

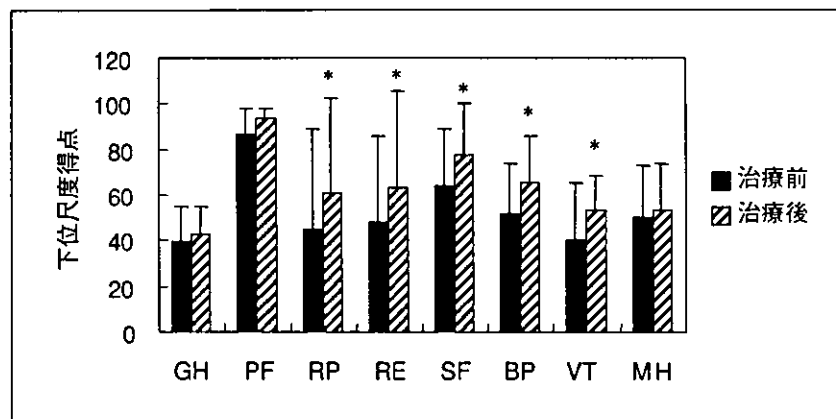


図6 男性における下位尺度得点—治療前後—
* $P < 0.05$ vs 治療前

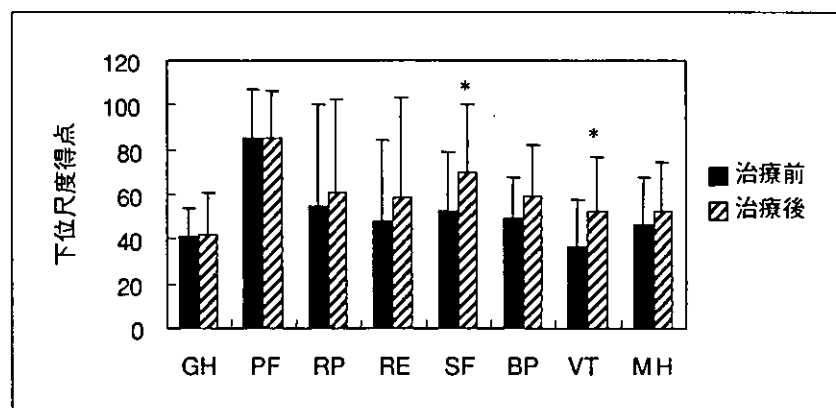


図7 65歳未満における下位尺度得点—治療前後—
* $P < 0.05$ vs 治療前

常役割機能—身体], [RE: 日常役割機能—精神], [SF: 社会生活機能], [BP: 体の痛み]および [VT: 活力]において有意にQOLの改善を認めた(図6).

年齢における下位尺度得点(治療前後): 65歳

未満群では[SF: 社会生活機能]および[VT: 活力]において有意にQOLの改善を認め(図7), 65歳以上群では[SF: 社会生活機能]および[MH: 心の健康]において有意にQOLの改善を認めた(図8).

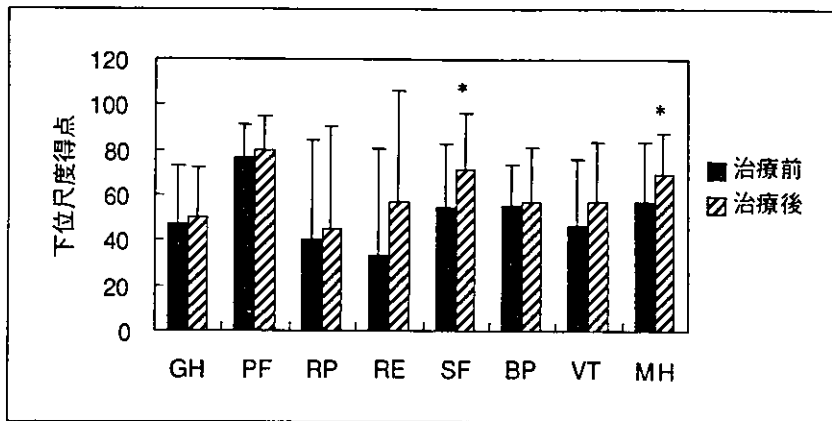


図8 65歳以上における下位尺度得点—治療前後—
* $P < 0.05$ vs 治療前

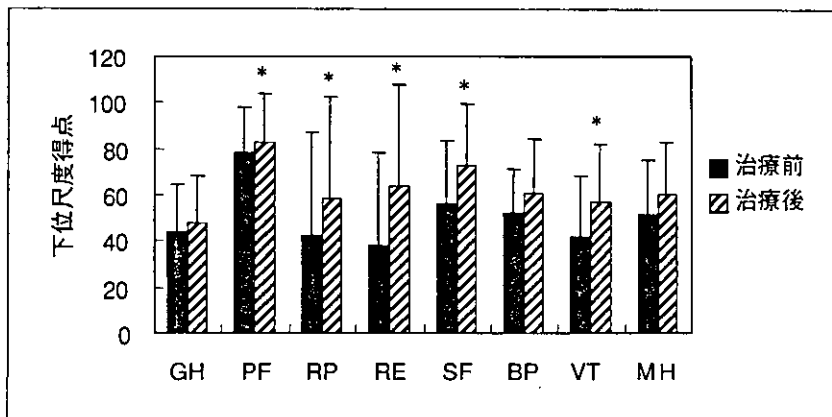


図9 腹部症状の改善症例における下位尺度得点—治療前後—
* $P < 0.05$ vs 治療前

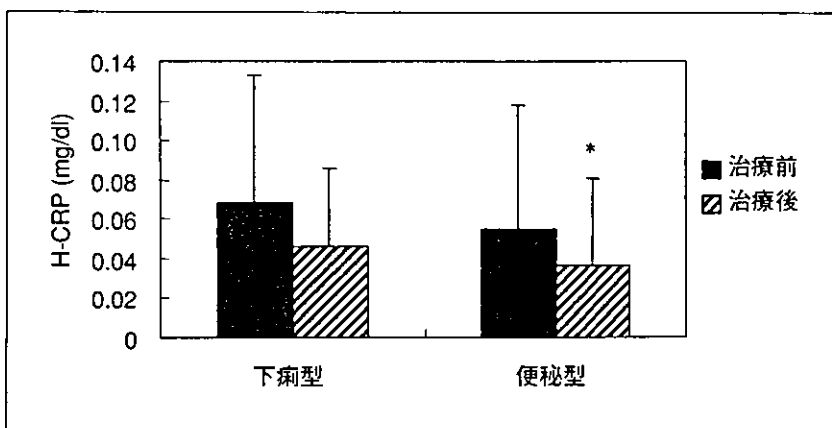


図10 血中H-CRP—治療前後—
* $P < 0.05$ vs 治療前

腹部症状の改善症例における下位尺度得点(治療前後)：腹部症状改善症例は21例(81%)に認めた。腹部症状改善症例では「PF：身体機能」, 「RP：日常役割機能—身体」, 「RE：日常役割機能—精神」, 「SF：社会生活機能」および「VT：活

力」の下位尺度において有意にQOLの改善を認めた(図9)。

2. 血中H-CRP

下痢型および便秘型(治療前後)：下痢型では治療後に低下傾向を示し、便秘型においては有

意にH-CRPの低下を示した(図10)。

考 察

本研究では、はじめにSF-36を用いてIBS患者と国民標準値のQOLの差について検討した。その結果、IBS患者はすべての下位尺度で低値を示し、IBSのQOL低下を確認した。そのなかでPFは比較的国民標準値に近い値を示し、IBSが機能的疾患であることを反映していると考えられる。次に、IBS患者の病型(下痢型、便秘型)による検討では、治療前のQOL評価では病型によって各下位尺度に差がなかったが、治療による下痢型と便秘型での下位尺度得点の変化では、SFの改善を認めていることが両型に共通で、精神的健康度の因子の改善をいずれの型でも示していた。同様に、治療前後でのIBS全体の検討でも、治療により精神的健康度の因子の改善を認めていた。また、性別においてはSF、BPおよびVTの改善は男女共通であり、女性ではさらにMHにおいて、男性ではRPにおいて有意にQOLの改善を認めたことが特徴で、女性は精神的健康度の因子の改善を示し、男性は身体的健康度の因子の改善も示した。年齢における検討では、65歳未満群および65歳以上群いずれも精神的健康度の因子の改善であった。腹部症状の改善症例における下位尺度得点では、8下位尺度中5下位尺度で有意に精神的健康度因子および身体的健康度因子のQOLの改善を認め、腹部症状の改善がよりQOLの改善を示したことは、IBSの治療目標として腹部症状の改善が第一に望まれることを示していると考えられる。以上より、本検討ではポリカルボフィル製剤投与により、IBS患者のQOLのうち精神的健康度因子を中心に改善し、とくにSFの改善に対して有用であった。ポリカルボフィル製剤はIBSの下痢型および便秘型いずれにも有効で、小腸や大腸などの中性条件下で消化管内容物の水分を吸収し膨潤ゲル化することにより消化管運動を間接的に調節する薬剤であり²⁰⁾、米国では一般薬として市販され、IBSの治療薬としては第一選択にあげられる薬剤と考える。

また、抗炎症作用の有しないポリカルボフィル製剤投与によるIBSの病態の改善の結果、血中H-CRP値の低下を認めたことは、IBSの微小炎症

の関与を再確認するものであり、IBSの予後因子としての活用への応用や、今後さらにサイトカインなどの関与について検討が必要と考える。

IBS患者のQOLをSF-36を用いて検討し、ポリカルボフィル製剤投与によりおもに精神的健康度因子の改善を認めた。また、病態改善により微小炎症の改善もみられた。

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原 著

過敏性腸症候群患者の大腸通過時間

千葉 俊美, 久多良徳彦, 安藤 達也, 春日井 聡, 金沢 康之
篠崎 博志, 高木 亮, 徳永 ゆみ, 猪股 正秋
折居 正之, 鈴木 一幸

要 旨：目的：過敏性腸症候群（IBS）患者のポリカルボフィルカルシウム製剤投与前後の大腸通過時間を Radiopaque marker 法を用いて検討した。対象：Rome II criteria を用いて診断した IBS 患者 26 名，Control 群として健常成人 7 名。方法：20 個の marker が入っているカプセルを 3 日間連続して 1 カプセルずつ経口投与した。第 5 日および第 7 日に腹部単純 X 線写真を撮影し，marker の数量を大腸通過時間に換算した。その後，ポリカルボフィルカルシウム製剤 3000mg/day の経口投与を開始し，8 週間後同様に再測定した。結果：全大腸通過時間および直腸 S 状結腸通過時間が便秘型および control 群で下痢型と比較し有意に通過時間の遅延を認めた。下痢型：大腸輸送時間は治療後に有意に延長を認めた。便秘型：大腸輸送時間は治療後に有意に促進した。結論：本製剤は IBS 患者の大腸通過時間の改善に有効性を認めた。

Key words : irritable bowel syndrome, colonic transit, calcium polycarbophil

緒 言

大腸運動機能測定は大腸運動測定（内圧測定法，腸音図，腸電図，Barostat，画像診断法）と大腸通過時間測定（RI 法，Radiopaque marker 法，バリウム法）に大別されている。過敏性腸症候群（irritable bowel syndrome; IBS）の大腸運動機能は，下痢型では上行結腸内圧の上昇，S 状結腸と直腸での便保持力の低下，食後の高圧な大腸収縮波（high amplitude propagating contractions; HAPC）の増加および上行，横行結

腸の通過時間の短縮を認める¹⁻³⁾。一方，便秘型では大腸全体特に S 状結腸の内圧上昇，HAPC が発現せず，左半結腸の通過時間の延長が見られるとされる⁴⁻⁶⁾。IBS の治療薬として下痢型には 5-HT₃ 受容体拮抗薬が⁷⁾，便秘型では 5-HT₄ の partial agonist が現在臨床応用されている⁸⁾。さらに，IBS 治療薬の 1 つであるポリカルボフィル製剤は，IBS 患者の腹部症状を改善し^{9,10)}，その結果 QOL の改善を得られている¹¹⁾。本研究では，IBS 患者の大腸通過時間をポリカルボフィル製剤投与前後で検討した。

Colonic transit in patients with irritable bowel syndrome

Toshimi Chiba

First Department of Internal Medicine, Iwate Medical University
Morioka, Iwate 020-8505, Japan

対 象

Rome II criteria¹²⁾を用いて診断したIBS患者26名を対象とした。その内訳は下痢型14名(女性9例, 男性5例), 便秘型12名(女性10例, 男性2例)で, 平均年齢52.0歳(18歳~77歳)であった。また, control群として基礎疾患を有しない健常成人7名(女性2例, 男性5例; 平均年齢40.9歳)を対象とした。

方 法

3種類(O marker, Double D marker, Tri-Chamber marker)のradiopaque marker (SITZMARKS[®])を3日間連続して朝食後の朝9時に内服した。1カプセルには20個のmarker

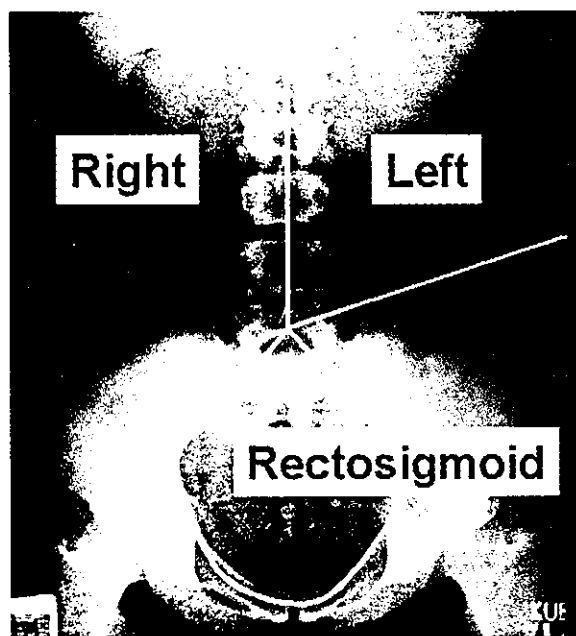


図1 Segmental colonic transit

Markers located to the right of the vertebral spinous processes above a line from the fifth lumbar vertebra to the pelvic outlet were assigned to the right colon. Markers to the left of the vertebral spinous processes and above an imaginary line from the fifth lumbar vertebra to the anterior superior iliac crest were assigned to the left colon. Markers inferior to a line from the pelvic brim on the right to the superior iliac crest on the left were judged to be in the rectosigmoid and rectum¹⁴⁾.

が入っており, 第5日および第7日に腹部単純X線写真を撮影しmarkerの数を測定した。その後, IBS患者に対して, 3000mg/dayのポリカルボフィル製剤を8週間経口投与し, 同様に腹部単純X線写真を撮影しmarker数を計測した。統計学的検討は, 全群比較ではボンフェローニ検定, 2群間比較ではt検定を用い, $P < 0.05$ 以下を有意差ありとした。

大腸通過時間測定法

大腸をArhanら¹³⁾の報告に基づき右側, 左側および直腸S状結腸に分割した(図1)。その後, 右側, 左側および直腸S状結腸のmarker数を下記計算式を用いて大腸通過時間に換算した^{13,14)}。

$$\text{大腸通過時間} = 1.2 (N_1 + N_2 + N_3);$$

N_1 = O marker数, N_2 = Double D marker数, N_3 = Tri-Chamber markers数

結 果

ポリカルボフィル投与前 (IBS および control 群) 全大腸通過時間

下痢型 3.2 ± 3.9 hr (Mean \pm SD), 便秘型 48.8 ± 32.8 hr, control群 31.0 ± 23.1 hr であり, 便秘型およびcontrol群が下痢型と比較し有意に通過時間の延長を認めた(図2)。

右側大腸通過時間

下痢型 0.34 ± 0.99 hr, 便秘型 6.6 ± 7.9 hr, control群 3.4 ± 3.4 hr であり, 便秘型が下痢型と比較し有意に通過時間の延長を認めた。

左側大腸通過時間

下痢型 0.94 ± 2.6 hr, 便秘型 29.3 ± 28.6 hr, control群 10.3 ± 8.7 hr であり, 便秘型が下痢型と比較し有意に通過時間の延長を認めた。

直腸 S 状結腸通過時間

下痢型 1.9 ± 2.4 hr, 便秘型 15.9 ± 5.9 hr, control群 17.3 ± 13.7 hr であり, 便秘型およびcontrol群が下痢型と比較し有意に通過時間の延長を認めた(図3)。

ポリカルボフィル投与前後 (IBS 群)

全大腸通過時間において, 下痢型では投与前 3.2 ± 3.9 hr, 投与後 10.4 ± 11.7 hr, 便秘型では

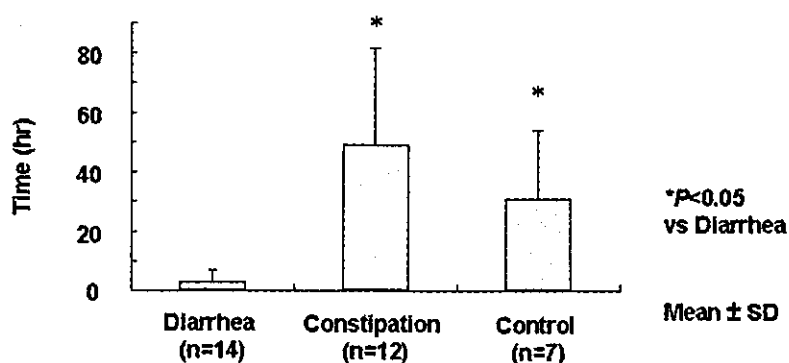


図 2 Mean total colonic transit times in patients with diarrhea- or constipation-predominant type of IBS and control.

Mean total colonic transit times in patients with constipation type and control were significantly delayed compared to diarrhea type. There was no significant data in the total colonic transit times between constipation type and control.

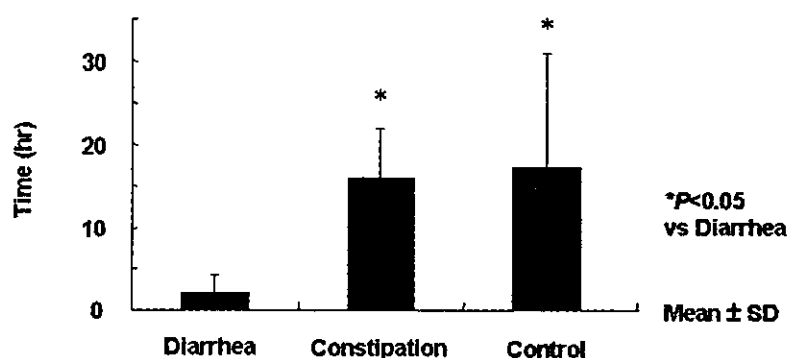


図 3 Mean transit times of the recto-sigmoid colon in patients with diarrhea- or constipation-predominant type of IBS and control.

Mean transit times of the recto-sigmoid colon in patients with constipation type and control were significantly delayed compared to diarrhea type. There was no significant data in transit times of the recto-sigmoid colon between constipation type and control.

前 48.8 ± 32.8 hr, 後 35.4 ± 37.8 hr といずれの型でポリカルボフィル投与前後に有意差を認めなかった。また, 下痢型の右側大腸通過時間, 左側大腸通過時間および直腸 S 状結腸通過時間は通過時間の延長傾向をみるも有意差を認めなかった。一方, 便秘型の右側大腸通過時間および左側大腸通過時間では短縮傾向を認めるも有意差を認めず, 直腸 S 状結腸通過時間には変化を認めなかった。

ポリカルボフィル投与後 (IBS 群) および control 群との比較

全大腸通過時間, 右側大腸通過時間, 左側大腸通過時間および直腸 S 状結腸通過時間のいずれにおいて, 下痢型, 便秘型および control 群で有意差を認めなかった。

考 察

本研究では, radiopaque marker 法を用いて大腸通過時間を測定した。その結果, 便秘型および control 群に比較し有意に下痢型の全大腸通過時間および直腸 S 状結腸通過時間の短縮が認められ, 下痢型の特徴と考えられた。また,

便秘型では control 群と比較して全大腸通過時間の遅延傾向を認め、右側および左側大腸通過時間でも同様に通過時間の遅延傾向を認めた。

IBS 患者におけるポリカルボフィル投与前後での大腸通過時間の測定では、治療後における大腸通過時間は、下痢型で延長を示し、便秘型では短縮を認めた。さらに、ポリカルボフィル製剤投与後の IBS 群の大腸通過時間は control 群と比較し有意差を認められず、本製剤は IBS の下痢型および便秘型の大腸通過時間の是正に有効な薬剤であることを確認した。

ポリカルボフィル製剤による IBS 患者の大腸通過時間の改善は、QOL 特に SF-36 の社会生活機能の改善を認め、さらに、腹部症状の改善は精神的健康度因子全体の改善に有用である¹¹⁾。また、本製剤は、中枢作用がなく必要に応じて消化管運動機能改善薬、自律神経調整薬および向精神薬などとの併用が可能であることから、IBS の治療ガイドラインの step 1 の治療薬と位置づけられている^{15,16)}。

結 論

Radiopaque marker 法を用いて IBS 患者の大腸通過時間を測定した。下痢型の全大腸通過時間および直腸 S 状結腸通過時間の短縮が認められ、便秘型では全大腸通過時間、右側および左側大腸通過時間の遅延傾向を認めた。ポリカルボフィル投与前後での大腸通過時間は、下痢型で延長を、便秘型では短縮を示した。本薬剤は IBS の大腸通過時間の是正に有効な薬剤である。

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Colonic transit in patients with irritable bowel syndrome

Toshimi Chiba, Norihiko Kudara, Tatsuya Ando, Satoshi Kasugai, Yasuyuki Kanazawa
Hiroshi Shinozaki, Ryo Takagi, Yumi Tokunaga, Masaaki Inomata
Seishi Orii, Kazuyuki Suzuki

First Department of Internal Medicine, Iwate Medical University

Our aim of this study was to examine colonic transit times in IBS patients both before and after administration of calcium polycarbophil. Methods: A total of 26 IBS patients and 7 controls were enrolled. Before administration of calcium polycarbophil, mean colonic transit times were calculated from the number of radiopaque markers in the colon. After oral administration of calcium polycarbophil for 8 weeks, the transit times were again measured. Results: The mean total colonic transit time and transit times of the recto-sigmoid colon in patients with constipation type and control were significantly delayed compared to diarrhea type. In diarrhea type, the mean colonic transit time increased after treatment. In constipation type, the mean colonic transit time decreased after treatment. Conclusion: Calcium polycarbophil is useful in improving colonic transit in IBS patients.

Regular Article

Factor analysis of Zung Scale scores in a Japanese general population

FUMINORI CHIDA, MD,¹ AKIRA OKAYAMA, MD,² NOBUO NISHI, MD² AND AKIO SAKAI, MD¹

Departments of ¹Neuropsychiatry and ²Hygiene and Preventive Medicine, School of Medicine, Iwate Medical University, Iwate, Japan

Abstract

The purpose of the present paper was to investigate the distribution of Zung Self-rating Depression Scale (SDS) scores in a general population and its factor structure. Questionnaires on SDS items were sent to 7136 randomly selected residents aged 20–79 years who lived in districts in Japan with high rates of suicide. Valid responses were received from 5547 residents (response rate: 77.7%). Factor analysis of the SDS scores was conducted. The SDS scores of the male subjects were significantly lower than those of the female subjects in all age groups. A reverse-J-shaped relationship was found between age groups and mean SDS scores for the male and female subjects. The highest mean score was in the age group of 20–39 years, and the lowest mean score was in the age group of 60–69 years for the male and female subjects. In factor analysis, two factors consisting of 12 items were extracted, and 10 of those 12 items covered six *Diagnostic and Statistical Manual of Mental Disorders* (4th edn; DSM-IV) criteria describing psychological disturbances of depression. The distribution of SDS scores differed depending on the age group. Major components of SDS in the subjects covered the DSM-IV criteria for psychological disturbances of depression.

Key words

depression, epidemiology, factor analysis, Japanese, Zung Self-Rating Depression Scale.

INTRODUCTION

The rate of mortality from suicide in Japan is relatively high compared to that of other developed countries.¹ It increased steeply to 25.4 per 100 000 (31 755 deaths) in 1998 and has not decreased since then. The steep rise in the rate of mortality from suicide in 1998 was caused by an increase in suicide among middle-aged men.² Depression is thought to be one of the major causes of suicide; the risk of suicide among depressive patients is higher than that among other psychiatric patients or mentally healthy people.³ Extant psychological autopsy studies have also revealed that most suicide victims had suffered from mental disorders such as depression.⁴ Programs aimed at prevention of suicide have thus focused on depression.^{5,6} We focused on

depression as one of the major causes of suicide in a community intervention trial in Japan.

The Zung Self-rating Depression Scale (SDS) and other simple self-reported scales for depression have been developed to identify people suffering from depression.^{7–9} The SDS has been used to assess depressive states in general populations.^{10–12} However, the usefulness of the SDS in representative samples has not been clarified.

In the present study we investigated the distribution of the SDS and its factor structure and examined the usefulness of the SDS for detecting depression in a general population.

METHODS

Study population

The present study was carried out as a part of the Suicide Prevention in North Rias Trial (SUNRIT), which aimed at improving people's knowledge of and attitude toward depression, and at reducing the rate of and mortality from suicide. The SUNRIT was conducted in

Correspondence address: Dr Fuminori Chida, Department of Neuropsychiatry, School of Medicine, Iwate Medical University, 19-1 Uchimaru, Morioka, Iwate 020-8505, Japan. Email: chida-psy@umin.ac.jp

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Iwate Prefecture, a prefecture in northern Japan with a high rate of suicide.

Four of the six municipalities in Kuji District (Kuji, Yamagata, Ohno, and Taneichi) served as an intervention area (population: 69 000). Miyako District, located next to Kuji District, also participated in the trial, three of the six municipalities in the district (Iwaizumi, Taro, and Niisato) serving as a control areas (population: 21 000). Both districts are along the Pacific and have a low population density (Kuji District: 65.5 people/km², Miyako District: 15.9 people/km²) and a high ratio of elderly people (population aged ≥ 65 years: Kuji District, 20.7%; Miyako District, 28.3%). The SUNRIT started in January 2002 and will continue until 2008.

We randomly selected subjects aged 20–79 years from lists of residents offered by the local governments. Residents unable to respond to our questionnaire, such as those who lived outside the municipality, those who were institutionalized, or those who were unable to answer due to severe illness, were excluded from the study.

Baseline survey

The baseline survey for this trial was conducted during February 2002 and June 2002. A questionnaire with a letter explaining the objective of the survey was sent to each subject. Items of the questionnaire consisted of (i) sociodemographic information (job, family members, marital status, education, financial situation, community participation etc.); (ii) lifestyles (smoking, drinking, diet, exercise etc.); (iii) mental health (knowledge of, views on, and attitudes toward mental disorders and suicide etc.); and (iv) the Japanese version of the SDS.¹³

Questionnaires were mailed to 7136 subjects. Participants were asked to complete the questionnaires if they agreed to participate in the study and to send them back to us. Written informed consent for participation in the study was obtained from all subjects. The respondents received an incentive, which was equivalent to ¥1000. Letters asking for response were sent twice to those who did not respond. Those who sent back incomplete answers were contacted and asked to complete the questionnaire. We had 5676 responses (a response rate of 79.5%).

The mean age of respondents was significantly higher than that of non-respondents (52.4 years vs 47.1 years, $P < 0.001$). Data from questionnaires in which there were no responses to more than two SDS items (questionnaires from 134 subjects) were not used for analysis. The ratio of subjects who did not respond to one item or two items was lowest in the youngest group both in male and female subjects (male, 0.9%; female, 1.7%; age group: 20–39 years). The ratio

tended to rise with increasing age (male, 6.2%; female, 7.8%; age group: 70–79 years).

For questionnaires in which there were no responses to one item or two items, scores of the missing items were substituted by mean scores in the same sex and age groups. We determined whether this procedure distorted the mean score by comparing with the mean score in subjects who responded to all 20 items and found no significant difference between the mean scores (data not shown). Eventually, 5547 SDS scores, equivalent to a response rate of 77.7%, were used for analysis. The response rates were different among age groups. The youngest age group had the lowest response rate and older age groups tended to have higher response rates.

Statistical analysis

The subjects were divided into five age groups: 20–39, 40–49, 50–59, 60–69, and 70–79 years. Analysis of variance was performed to compare the SDS scores between sexes and between age groups. The SDS scores were divided into four levels according to the classification by Barrett *et al.*: no or insignificant symptomatology, 20–39 points; mild depressive state, 40–47 points; moderate depressive state, 48–55 points; and severe depressive state, ≥ 56 points.¹⁴ Factor analysis was conducted on the SDS scores using the Promax rotation algorithm with various criteria for the number of factors, such as Kaiser's criterion (eigenvalues > 1.0), a scree test, and the interpretability of resulting factor structures. The cut-off point of the initial eigenvalue was set at 1.0, and the primary criterion for item inclusion was set at least at 0.40 (absolute value). Factor analysis was also performed on the SDS scores for each sex group and each age group. SPSS for Windows Ver. 11.0. (SPSS, Chicago, IL, USA) was used for all statistical analysis.

Ethics

The present study was approved by the Ethics Committee of Iwate Medical University.

RESULTS

Descriptive findings

The mean age of the male subjects was significantly lower than that of the female subjects (51.9 and 52.8 years, respectively, $P = 0.034$). The mean SDS score for all subjects was 39.3 points (Table 1). The mean SDS score of male subjects (38.2 points) was significantly lower than that for female subjects

Table 1. Zung self-rating depression scale scores (mean \pm SD)

	All	Men					Women					P			
		20-39 years	40-49 years	50-59 years	60-69 years	70-79 years	20-39 years	40-49 years	50-59 years	60-69 years	70-79 years				
Participants (n)	5547	2602	579	539	514	568	402	473	733	473					
Response rate (%)	77.7	75.4	64.1	73.5	77.4	83.4	85.4	80.1	83.7	80.7					
Age (Mean \pm SD)	52.4 \pm 16.0*	51.9 \pm 15.9													
SDS score (Mean \pm SD)	39.3 \pm 7.8**	38.2 \pm 7.6	39.1 \pm 7.6	38.7 \pm 7.6	38.3 \pm 7.5	37.1 \pm 7.2	38.0 \pm 7.9	< 0.001*	40.3 \pm 7.9	41.2 \pm 8.2	40.3 \pm 7.7	39.8 \pm 7.6	39.5 \pm 7.7	40.8 \pm 8.4	< 0.001*
High or moderate SDS score (%)	13.7	10.6	13.1	11.5	10.7	7.2	10.7	0.025**	16.3	20.6	15.3	15.0	13.0	18.2	0.002*

SDS, Zung Self-Rating Depression Scale.

** $P < 0.05$; *** $P < 0.01$ by t -test for sex.

†ANOVA for age group.

‡ χ^2 test for age group.* $P < 0.05$; ** $P < 0.01$ by Tukey's method.

(40.3 points; $P < 0.001$). The mean scores for male subjects were significantly lower than those for female subjects in all age groups ($P < 0.01$).

In the male subjects, a reverse-J-shaped relationship was observed between the mean scores and age groups. The highest mean score was in the age group of 20-39 years. The lowest mean score was in the age group of 60-69 years, and the mean score in this age group was significantly lower than those in the age groups of 20-39 years and 40-49 years ($P < 0.01$). Similar patterns were observed in the female subjects.

The highest mean score was in the age group of 20-39 years, and the lowest mean score was in the age group of 60-69 years, which was significantly lower than that in the age group of 20-39 years ($P < 0.01$).

High or moderate SDS scores (i.e. severe or moderate depressive states) were found in 13.7% of the subjects. The percentage of male subjects with high or moderate SDS scores (10.6%) was significantly lower than the percentage of female subjects with high or moderate SDS scores (16.3%; $P < 0.01$). The age group with the lowest percentage of subjects with high or moderate SDS scores was the age group of 60-69 years for both male and female subjects.

SDS scores for each item

High scores were found for 'decreased libido' (item 6, 2.87 points), 'hopelessness' (item 14, 2.73 points), 'emptiness' (item 18, 2.51 points), and 'dissatisfaction' (item 20, 2.66 points), and low scores were found for 'weight loss' (item 7, 1.33 points), 'psychomotor retardation' (item 12, 1.38 points), and 'suicidal ideation' (item 19, 1.32 points). Significantly lower scores were found in the male subjects than in the female subjects: for 'depressed affect' (item 1) the difference between male and female was 0.13 points; 'crying spells' (item 3), 0.26 points; 'sleep disturbance' (item 4), 0.14 points; 'decreased libido' (item 6), 0.61 points; 'constipation' (item 8), 0.39 points; 'tachycardia' (item 9), 0.10 points; 'fatigue' (item 10), 0.15 points; 'confusion' (item 11), 0.08 points; 'psychomotor retardation' (item 12), 0.08 points; 'irritability' (item 15), 0.11 points; and 'indecisiveness' (item 16), 0.10 points ($P < 0.01$). In contrast, for the scores for 'emptiness', the difference between male and female was 0.10 points and that for 'dissatisfaction' was 0.11 points; these were significantly higher in the male subjects than in the female subjects ($P < 0.01$). Scores for all items except 'constipation' (item 8) and 'agitation' (item 13) were significantly different in the age groups ($P < 0.01$).

Table 2. Factor analysis with Promax rotation of SDS by age group

No. factors ¹	Men							Women					
	All 3	All 2	20-39 5	40-49 4	50-59 3	60-69 5	70-79 4	All 3	20-39 4	40-49 4	50-59 4	60-69 4	70-79 6
1. Depressed affect	○	○	○	○	○	○	○	○	○	○		○	○
2. Diurnal variation	○	○	○	○		○		○			○	○	○
3. Crying spells	○	○	○	○	○	○	○	○	○	○	○	○	○
4. Sleep disturbance	○	○	○	○	○			○			○		○
5. Decreased appetite			○				○		○				○
6. Decreased libido				○									
7. Weight loss						○							
8. Constipation						○	○					○	○
9. Tachycardia	○	○	○		○	○	○	○		○	○	○	
10. Fatigue	○	○	○	○	○		○	○	○	○	○	○	○
11. Confusion	○	○	○	○		○	○	○		○	○	○	
12. Psychomotor retardation		○			○		○			○	○	○	○
13. Agitation	○	○	○	○	○	○	○	○	○	○	○	○	○
14. Hopelessness	○	○		○	○		○		○		○	○	○
15. Irritability	○	○	○	○		○		○	○	○		○	○
16. Indecisiveness					○		○						○
17. Personal devaluation		○	○	○	○	○	○	○	○	○	○	○	○
18. Emptiness	○	○	○	○	○	○	○	○	○	○	○	○	○
19. Suicidal ideation	○		○					○	○	○		○	
20. Dissatisfaction	○	○	○	○	○	○	○	○	○	○	○	○	○

SDS, Zung Self-rating Depression Scale.

¹Factors that produced eigenvalues >2.0 were selected for further analysis.

○, Primary criterion for item inclusion was a loading of at least 0.400 (absolute value).

Factor analysis

Factor analysis was performed on the SDS scores for all male subjects, all female subjects, all subjects, and subjects in each age group. Ten to 15 items were extracted by factor analysis for male subjects, female subjects, all subjects, and subjects in each age group. Three factors were given in all subjects, two factors in male subjects, and three factors in female subjects. Table 2 shows numbers of factors and items with loading values of at least 0.40. In the factor analysis for all subjects, 13 of the 20 items were extracted. For the male subjects, the 14 items were extracted. For the female subjects, 13 items were extracted. There was no significant difference between numbers of extracted items in the male and female groups or between numbers of extracted items in the age groups. Similar patterns were observed in each age group for male and female subjects.

Factor analysis was re-performed on items with loading values of more than 0.40 in all male subjects, all female subjects, and all subjects. In all subjects, factor I consisted of item 1, item 2, item 3, item 4, item 9, item 10, item 11, item 13, and item 15, and factor II consisted

of item 14, item 18, and item 20 (Table 3). The eigenvalues of factor I and factor II were 3.9 and 2.6, respectively. In all male subjects, the two-factor solution explained 50.0% of total variance. Results of factor analysis were similar. The eigenvalues of factor I and factor II were 4.0 and 2.7, respectively. The two-factor solution explained 47.9% of total variance. In all female subjects, the two-factor solution explained 50.8% of total variance. Results of factor analysis were similar. The eigenvalues of factor I and factor II were 3.9 and 2.7, respectively.

DISCUSSION

Background and setting of the study

The number of suicides in Japan has been increasing since 1998, the rate of mortality from suicide now being the highest since World War II. Iwate Prefecture, where our survey areas were located, has had one of the highest rates of suicide in Japan during the past 20 years. Our survey areas, Kuji and Miyako, have a particularly high rate of suicide in Iwate. The SDS was given to residents in the areas with high rates of suicide. The SDS

Table 3. Factor analysis with Promax rotation of the Zung Self-Rating Depression Scale[§]

Factor [†]	All		Men		Women	
	I	II	I	II	I	II
1. Depressed affect	0.70	-0.02	0.69	-0.02	0.68	0.01
2. Diurnal variation	0.46	0.11	0.48	0.10	0.48	0.07
3. Crying spells	0.64	-0.02	0.59	-0.01	0.63	0.02
4. Sleep disturbance	0.49	0.02	0.50	0.04	0.47	0.00
9. Tachycardia	0.49	-0.07	0.47	-0.03	0.49	-0.09
10. Fatigue	0.59	-0.06	0.58	-0.05	0.60	-0.09
11. Confusion	0.68	0.09	0.70	0.06	0.70	0.06
12. Psychomotor retardation			0.51	0.07		
13. Agitation	0.60	0.05	0.63	0.00	0.60	0.07
14. Hopelessness	0.08	0.45	0.05	0.48		
15. Irritability	0.66	0.03	0.67	-0.02	0.65	0.05
17. Personal devaluation			0.03	0.50	0.01	0.49
18. Emptiness	-0.09	0.91	-0.09	0.94	-0.11	0.97
19. Suicidal ideation	0.31	0.13			0.31	0.18
20. Dissatisfaction	0.04	0.65	0.07	0.58	0.13	0.57
Eigenvalues	3.9	2.6	4.0	2.7	3.9	2.7
Contribution (%)	30.0	20.0	28.6	19.3	30.0	20.8

Bold, primary criterion for item inclusion was a loading of no less than 0.4 (absolute value).

Excluded items were items 5, 6, 7, 8, 12, 16 and 17 for all subjects; items 5, 6, 7, 8, 16 and 19 for male subjects; and items 5, 6, 7, 8, 12, 14 and 16 for female subjects.

[†]Factors that produced eigenvalues >1.0 were selected for further analysis.

[§]Loaded value for factor I and II from the factor analysis among all subjects and male/female subjects.

scores were statistically analyzed to examine the distribution in a general population and its factor structure. Then the results of factor analysis were compared with *Diagnostic and Statistical Manual of Mental Disorders* (4th edn; DSM-IV) criteria for depression in order to consider the validity of the SDS for detecting depression in a general population.

A limitation of the present study was that the surveys were conducted in the region with the highest rates of suicide in Japan, and the findings cannot be generalized to explain the tendency in the whole Japanese population.

Descriptive findings

There have been a few studies in which the distributions of SDS scores in age groups in Japan have been investigated.¹⁵⁻¹⁷ In recent studies in Japan and in other countries, however, mean scores of the SDS in all age groups were not compared.^{18,19} Subjects in recent studies were limited to groups of young, middle-aged or elderly subjects. Studies using subjects of relatively young age have shown that young subjects tend to have high scores and that scores become lower with advancing age.^{15,16} In contrast, studies using elderly subjects have shown that elderly subjects tend to have high

scores.¹⁷⁻¹⁹ In the present study we obtained SDS scores for subjects with a wide age range, although the response rates were different among age groups. The difference of the SDS scores between male and female in the youngest age group with the lowest response rate was similar to those in other age groups. In addition, similar patterns were observed in each age group for male and female subjects in the factor analysis. Therefore, it is unlikely that the difference of the response rates among age groups distorted the distribution of the SDS scores, therefore we were able to compare scores among all age groups.

In both male and female groups, reverse-J-shaped relationships were found between mean SDS scores and age groups. The lowest mean score was in the age group of 60-69 years. Therefore, influence of sex and age should be taken into consideration when using the SDS as a screening test for detecting depression. For example, the cut-off point of SDS should be changed depending on the age group and sex.

Summary of factor analysis

In the factor analysis of SDS scores, two factors consisting of 12 SDS items were extracted. Although the SDS is different from the DSM-IV in the administra-

tion, in that the former is self-reported and the latter is based on a clinical interview, we compared the 12 items with the DSM-IV criteria for depression in order to examine the usefulness of SDS as a screening test. We referred to Zung's studies on the SDS.^{10,20} Zung compared SDS items with DSM-III criteria and suggested that 17 SDS items (excluding item 2, 8, and 9) covered the DSM-III criteria. In the present study, 10 out of the extracted 12 SDS items covered six DSM-IV criteria describing psychological disturbances of depression. 'Diurnal variation' (item 2) and 'tachycardia' (item 9) did not correspond to DSM-IV criteria. In contrast, three DSM-IV criteria (weight loss or weight gain, item 3; feeling of worthlessness or excessive or inappropriate guilt, item 7; and recurrent thought of death and suicide ideation, item 9) were not covered by the SDS items extracted by factor analysis. In other words, somatic items of the SDS tended to be excluded by factor analysis in the present study. This suggests that somatic items may be influenced by some factors other than depression.

Strategy for screening for depression

The results of the present study suggest that the SDS is not suitable for detecting depression in individuals who mainly show somatic symptoms. Such individuals tend to consult family physicians about their somatic disturbances. For prevention of suicide, family physicians are also expected to have skills to detect depression in patients manifesting somatic symptoms. There is a need to develop a strategy for screening for depression among residents using a combination of the SDS for detecting depression in individuals with psychological symptoms, and clinical interviews in a medical setting for detecting depression in individuals with somatic symptoms. For the development of such a strategy, further study is needed to determine whether residents screened out by the SDS suffer from major depression.

CONCLUSIONS

Major components of SDS items in subjects in the present study covered the DSM-IV criteria describing psychological disturbances of depression. Psychological factors should be focused on as part of the strategy to detect major depression among residents.

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地域と医療機関の連携による自殺予防活動

智田文徳, 酒井明夫, 高谷友希, 青木康博