

4. 足底挿板とスポーツ障害

下肢などにかかる負担の軽減策として、靴や足底挿板のミッドソール素材による、着地衝撃の軽減効果が認められている¹⁷⁾。元来ヒトは、足のアーチによる衝撃吸収機能を備えている。一般の者に比べ、アスリートは動きが激しくなる分、靴により発生する衝撃を緩衝する必要があるため、靴のソール素材の開発の恩恵を受けている。一方、一般人も筋力の低下や過体重などが原因で、下肢の関節に過負荷がかかる場合が増えている。これらのケースに対して、競技者同様に、靴に着地衝撃の軽減効果がある素材が使われているものを使用する意義は高い。しかし、このような靴が購入されるかは、その認知度を察するに一般化しているとは言い難い。このため足底挿板とともに使用価値が科学的に認められた商品は、スポーツマネジメントなどの領域の理論により、マーケットに一般化できるように図ることには意義がある。

足底挿板の使用価値に関しては、足底挿板による下肢の運動制動に関する運動学的な研究が、後足部の回内外運動を中心として積極的に行われている^{18,19)}。これは、後足部の過回内やこれに伴う頸骨回旋が、様々な下肢ランニング障害の主要な危険因子であるとみなされているためである。

近年、足部の回内外モーメントや膝関節の内外転モーメント、内外旋モーメントなどキネティカルな変量に着目して、足底挿板の効果を検討した研究がみられる²⁰⁾。一般的に足部の回内外は、下腿回旋と連動するとされている²¹⁾。

我々の研究結果において、平均年齢 20±4 歳の学生 22 人の足型を採取したところ、正常足者が 27%であったのに対して、回内足 46%と扁平足 20%と正常足者に比べ、異常足者の割合が多い結果が得られた。この年齢時に正常足の割合が少ないという結果は、その後下肢の関節障害を発症する可能性が予想される。このような、足裏の形状不良のサポートに足底挿板の有効活用が期待されている。

わが国でもスポーツメーカを主として、障害の予防策としての靴、靴下、および足底挿板の開発がなされている。しかし、それを十分に裏付ける根拠は少ない。この3つのツールのうち靴下と足底挿板は、靴に比べ

安価に活用できる経済的利点がある。科学的な裏づけを伴った健康づくりのためのツールは社会貢献度も高く、現在の市場にとっても必須アイテムと成り得る²²⁾。

欧米では足専門医 (Podiatrist) 制度が確立しており、皮膚科医、形成外科医、創傷専門看護師などとの連携により、足病変の治療が行われている²³⁾。わが国においても、日本人を対象とした検討研究により、欧米同様に足の専門家の確立は可能であることがうかがえる。

わが国における、スポーツと足底挿板に関する主な文献は、表 4 に示した。大久保の腸頸靭帯炎の症例を集めた研究²⁴⁾では、腸頸靭帯炎はO脚の者だけでなく、そうでない者や過回内足の者にも発症し、足部が過回内になると、下腿より内旋して結果的に腸頸靭帯が引き寄せられるとした。

腸頸靭帯炎発症者に 3mm の内側ウェッジでは効果がなかったが、5mm では下腿の内旋が抑制されることが報告された²⁵⁾。それまでの足底挿板の効果判定は、患者の主観や主治医の勘を頼りに義肢装具士に委ねられていた。足底挿板とスポーツの関連研究は、1978 年の James¹⁹⁾の文献以降、わが国では横江ら³⁾の 1982 年論文からとその歴史は浅い。

5. スポーツマネジメントの成功事例

前述したように、科学的根拠を得た事象が市場で普及するとは限らない。生活習慣病の予防改善としてのウォーキングプログラムも一般化するのに多くの年数を要した。

一般化することを日常化と捉えると、障害予防する際に物品が必要な場合は、それが消費者の購入時の選択品となっている必要がある。このため、ビジネスを意識したマネジメント領域のノウハウが必要と考えられる。以下にスポーツビジネスの成功例を示し解説する。

過度な使用による障害が、選手生命ばかりか日常生活に支障をきたすことも周知の事実である。このため、正しく効果的な障害予防、および健康づくりの方法が、国民に一般化することが重要なことと考えられる。しかしながら、実際は誰しも予防よりも健康を害してはじめて、その重要さに気づくことが多い。ここにも、ス

ポーツ・健康づくりのマネジメント理論が必要と成りうる。

一方、市場の発展と大学の教育プログラムは連動している²⁵⁾。身体活動を活用したビジネスには、スポーツビジネスがある。健康づくりのためには、科学的根拠の裏づけをもつ運動方法がある。この両者を活用して健康づくりの施策が、わが国において普及定着するためのマネジメントの理論が見いだせるのではと考えられる。近年、アメリカではこの実績として、プロスポーツ界におけるビジネスとスポーツマネジメント論が普及発展した。

ブランディングの進化の本質「消費者と経営者」の考察によれば、ブランドの進化には、6段階がある²⁶⁾。これらの段階は、世界的に著名なブランドがつけられてきた段階だけでなく、そのブランドのマインドシェアや株価、スポーツの場合は、ファン基盤に影響を及ぼしている。

スポーツのチームとリーグを含む大部分の組織は、以下に述べるブランディングの過程における5番目の同志としてのブランドを目指している。

すなわち、第1段階は、日用品として扱われている、ブランドを必要としない商品である。この段階では、商品は代替えが可能のため、顧客は商品の違いを区別することができない。例えば、コンビニの水がそうである。

第2段階は、ブランド紹介の段階である。ブランド名が確認に使われる。ブランドがこの段階に達すると、消費者は記憶にあるブランド商品を、ブランドネームが付いているから品質が良いと信じて購入する。

第3段階は、ブランドの個性化である。ブランドネームは消費者の感性への追訴や、商品の優位性といったマーケティングの支援によって独り立ちしていく。この段階では、商品を消費者の個性と結び付けて購買のプロセスに新たな局面をもたらすようになる。

第4段階は、消費者はブランドを所有するまでになる。地域住民がすぐにローカル企業のロゴやマスコット、あるいはキャッチフレーズに気づけば、それ以上の説明は不要となる。

第5段階は、ブランドがアイデンティティをもつようになり、消費者はそれを注意深く評価するようにな

る。

そして、第6段階は、ブランドが政策になるとしている。このように、ビジネスマネジメントの分野では、マーケットに商品が受け入れられるようになるまでを体系化している²⁷⁾。この理論を健康づくりやそのための施策がマーケットに受け入れられるように図るためのノウハウとしていけば、科学的に得られた結果がマーケットに定着するのに有効な手法となるのではと考えられる。

別のメジャーな事例としてNBAは、1948年夏にバスケットボール・アソシエーション・オブ・アメリカ(BAA)とナショナル・バスケットボール・リーグ(NBL)が合体した結果17チームを商品とするリーグとなった。このNBAも第1段階から積み上げて市場に普及定着した成功事例である。

スポーツマネジメント普及の要因について原田²⁵⁾は、1980年代から1990年代にかけて北米を中心として急速に進展したスポーツのビジネス化とグローバル化という社会変化と、それに伴って起きたスポーツマネジメントに対する世界的な関心の高まりという二つがあると述べている。また、スポーツビジネスの発展とスポーツマネジメントへの関心の高まりは、やがて高等教育における専門家の養成と学問的知識体系の整備に拍車をかけることになった、としている。

また、一般に科学の発展とそのパラダイムの形成には、大学の学部学科構成およびその制度を支える支持集団としての職業集団、そして研究成果を開示する学会および研究業績を蓄積する学術雑誌が不可欠である。スポーツマネジメントが発展してきた過程は、他の学科領域の発展とも類似しており、社会経済現象としてのスポーツの進化が、新しい職業領域と研究領域を生み、大学の学部学科構成やカリキュラムを変え、研究者や大学院生、そして一般人から構成される支持集団を形成し、新しい学会を必要としたとしている。しかしながら、わが国の場合、スポーツのビジネス化と産業化はようやく緒についたばかりで、スポーツマネジメントの職業集団や研究成果を共有する専門家集団の形成は、欧米に比べると遅れていると述べている。

福林²⁸⁾は、ハンドボールが盛んなノルウェーにおいてオリンピック前に、あるスーパースターがACL損傷

を起こしたことを契機に、Engbretsen, Bahr ら²⁸⁾が予防の重要性を説き、予防プログラムの開発を実施し、それを担当大臣が了解して、国家予算でスポーツ外傷研究所をノルウェー大学体育学部併設することになったと述べている。

この事例を、スポーツ障害予防の施策上の成功例として捉え、わが国における健康づくりのための障害予防策が科学的根拠を有し、かつ、国民に還元される参考例としたい。この場合に得られた根拠を市場に還元する専門領域との協働作業が必要と考えられる。

6. 今後の研究の展開と課題

わが国の市場の健康ニーズは、ますます高まっている。健康産業の一要素であるメタボリック症候群対策の関連市場規模だけでも、1兆6千6百億円とも推測されている²⁹⁾。

戦後の健康づくりは、公衆衛生および西洋医療の整備を主に展開されてきた。体育・スポーツ・健康づくりのための運動の分野は、医療系資格を除いて、現時点で国家資格がない。健康運動指導士など設置当初は、将来国家資格になることが期待されたものもあるが昭和63年に厚生大臣の認定事業として創設されて以来、未だ国家資格に至っていない。しかしながら、その養成カリキュラムは進歩しており、今後の有資格者の活躍などにより、国の資格となることが期待されている。熊谷は、リサーチ・コアプロジェクトの中で研究成果を社会へ還元するための高度専門職としての身体運動支援士(仮称)の必要性をあげており、健康づくり・福祉分野の国家資格が目指されている³⁰⁾。なお、身体活動を介した、健康づくり養成講座のテキストなどには、疾病予防および運動療法の両面において、体育学分野の研究成果に基づくカリキュラムが有効活用されている。

科学的に認められたことが市場に定着するためにはビジネスとして成り立つことが重要となる。すなわち社会においてその市場が確立されていくことやその中で専門家が必要とされ国家資格などが設置され、雇用が創出されることによると考えられる。わが国における、障害予防と足底挿板の関係解明の歴史は浅く、かつ運動障害と足底挿板の関係となると、未だに未開のまま

である。競技者の下肢に関する障害予防および高齢者の変形性膝関節症などの下肢障害対策として、足底挿板の有効活用のための証拠の構築をすすめることと、解明された証拠が市場に受け入れられるまでをスポーツマネジメント学の領域と協働し検討することが今後の課題である。

7. まとめ

本資料では、わが国における下肢障害の現状とその対策としてACL損傷にふれたうえで、障害予防策としての足底挿板の可能性をこれまでに成された研究成果より要約した。また、科学的裏付けを伴った根拠が市場に普及定着するための方策として、スポーツ・健康マネジメントの成功事例を示した。

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— Report —

The Occurrence of Emotional/Mental Stress-Induced Atypical “Ketosis-prone Type 2 Diabetes” in Newly Diagnosed Japanese Subjects—Preliminary observations

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1. Introduction

The onset of diabetes mellitus secondary to emotional stress has been cited frequently in the literature. Balasubramanyam et al.^{1), 2)} and Umpierrez³⁾ suggested a need for a more accurate classification (A β classification) of ketosis-prone diabetes (KPD) in recent articles, including their own aimed at guiding clinical practice and pathophysiological studies. KPD, an emerging form of diabetes defined by presentation with diabetic ketoacidosis, is phenotypically heterogeneous. We have read their study with great interest and wondered whether there were any stressful life events before the actual “onset” of ketosis and/or ketoacidosis in their cases (specially, Type 2B A- β +)¹⁾⁻³⁾.

Psychological stress is widely recognized among the environmental factors playing a role the development of diabetes^{5), 6)}. However, this concept is vague, and there are individual differences, so it is difficult to provide direct substantiation in humans with exacerbating factors other than hyperglycemia or

stress stimulus. The authors have treated some cases, which have been tentatively referred to as emotional stress-induced Atypical “KPD”.

2. Research design including Cases presentation and Methods

The index case involved a 63-year-old homemaker who had worries concerning serious problems with her inheritance. She became aware of polydipsia and polyuria in addition to systemic fatigue at the end of 1997. She began to lose weight (-13kg/3 months) and started drinking mineral water due to extreme thirst. In February 1998, she lost consciousness after urination and was hospitalized immediately because her blood glucose was 420 mg/dl and HbA_{1c} was 15.0 % (reference value; 4.8-5.8%). On admission, her weight was 67 kg (BMI: 24.6 kg/m²), feeling exhausted, and a blood gas analysis showed pH 7.425 and 556 μ M/l total ketone bodies. She was negative for anti islet cell (ICA) and glutamic acid decarboxylase (GAD-65) antibodies. The insulin treatment was intensified and the

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required insulin dosage was decreased following continuous subcutaneous insulin infusion (CSII) after hospitalization. After the metabolic imbalance such as hyperglycemia was corrected, the fasting serum C-peptide concentration was 3.1 ng/ml. The insulin infusion was withdrawn on the 31st day of administration, she is currently under observation while maintaining glycemic control (HbA_{1c} 6.4 %) using 3mg/day glimepiride and 750mg/day metformin (first line in table).

Table 1 shows the clinical characteristics of six adults, including the case described above, who do not have a history of consuming large amounts of soft drinks⁷⁾ and obvious changes of inhibited food-intake and/or an over-consumption of alcohol, but do include episodes within the past three or eight months from the point when the patients noticed typical symptoms of diabetic ketosis and/or mild ketoacidosis which were determined to be the "onset". No history of any obvious infections (abscesses, sepsis, urinary tract and upper respiratory infections) was found, such as cerebro-cardiovascular disease. All of the cases indicate a novel presentation of diabetes and insulin was temporarily used along with CSII and intensified insulin treatment. They presented diabetic ketosis as the initial manifestation of the disease. Such patients are usually relatively obese, upper middle-aged adults without any immunologic evidence of type 1 diabetes (JDS/WHO 1998 and ADA 2005 classification: Type 1A [autoimmune]). We did not find any severe acidosis in these cases, because the relative high insulin levels may have mitigated the development of lipolysis and ketogenesis. Problems of internal conflict and coping and/or the allostatic response of the patients were involved, in addition to aging and events

including individual differences⁸⁾. The clinical characteristics and clinical course of these patients are shown in Figure 1 and Table 2. One limitation of this retrospective investigation is that we did not measure the level of stress. However, it was not easy to measure the emotional or mental stress directly at that time.

3. Results and discussions

The definite pathophysiology of ketosis-prone type 2 diabetes remains unknown⁴⁾. Psychological stress is an important trigger for both an insufficiency of insulin secretion and insulin resistance⁶⁾. These conditions can be associated with an absolute indication of insulin, an involvement of slowly progressive "glucose toxicity"⁹⁾, a correlation between idiopathic type 1 (Type 1B) of the honeymoon remission or genetic/ethnic minority variation²⁾⁻⁴⁾, a correlation with metabolic syndrome¹⁰⁾ or human herpes-virus 8 infection¹¹⁾ and Björntorp's theory¹²⁾. Can an episode of extreme stress be a potential trigger of these atypical diabetes manifestation (KPD Type 2B A-β + 2)? Preserved β-cell function is also a feature of KPD even in Japanese subjects^{9), 10)}. The establishment of the clinical condition of type 2 diabetes includes a heterogeneous spectrum of symptoms and it is believed that such cases may be due to the influence of our modern "stressful society". The mechanisms of this phasic course might be still speculative, so this hypothesis necessitate a thorough investigation. However, the recognition of this type of patient is important and has implications for adequate long-term management strategies for counseling and emotionally-focused therapy in the follow-up.

Table 1: Clinical characteristics of the cases

No.	Age / Sex (years)	Family history of diabetes / Flu-like symptoms / MVC*	Episodes of stressful events **	Performance at diagnosis			Blood total Ketone (μ M/l) / Ketonuria	Pancreatic islet autoantibody (GAD-65 / ICA)	Glucagon test at glycemic control, CPR ng/ml (before/6 min.)	Observation period (years) / Final HbA _{1c} (%)	Recent treatment
				BMI / Maximum BMI (Kg/m ²)	Plasma glucose (mg/dl) / HbA _{1c} (%)*	pH / HCO ₃ (mEq/l)					
1)	63 / F	(+) / (-) / (-)	Troubles with inheritance	24.5 / 30.1	420 / 15.0	7.42 / 24.4	556 / (1+)	(-) / (-)	3.1 / 5.8	4.5 / 6.4	Diet + BG, SU
2)	61 / F	(-) / (-) / (-)	Business bankruptcy & suicide of a brother	23.1 / 26.5	324 / 10.8	7.419 / 25.7	596 / (1+)	(-) / ND	1.5 / 3.2	4.1 / 5.7	Diet + SU
3)	60 / M	(-) / (-) / (-)	Gamma knife treatment due to acoustic neuroma	24.1 / 25.8	806 / 12.6	7.38 / 24.9	383 / (1+)	(-) / (-)	2.7 / 6.3	2.9 / 5.8	Diet + SU, α GI
4)	55 / F	(-) / (-) / (-)	Death of husband & moving from a house	29.6 / 31.3	368 / 8.9	7.38 / 22.6	1,821 / (2+)	(-) / (-)	Urine CPR 42 μ g/day	1.2 / 6.0	Diet
5)	46 / M	(+) / (-) / (-)	Forced job change & disability for work	22.9 / 25.6	575 / 11.3	7.39 / 20.6	2,381 / (3+)	(-) / (-)	0.5 / 1.9	4.2 / 11.2	SU & Recurrence of KPD with brain abscess, Death
6)	55 / M	(+) / (-) / (-)	Serious work problems	17.9 / 23.1	549 / 16.5	7.46 / 25.2	1,551 / (2+)	(-) / (-)	1.4 / 3.9	8.5 / 5.8	Diet + SU

M: Male, F: Female, *MVC: Micro-vascular complications, **: Within 3 or 8 months prior to "onset", BMI: body mass index, ***: HbA_{1c}; HPLC method.

GAD-65: Anti glutamic acid decarboxylase antibody (Cosmic corporation, Tokyo),

ICA: Islet cell antibody (Indirect immunofluorescence method: Scripps Research Institute, San Diego, CA), KPD: Ketosis-prone diabetes, SU:sulfonylureas, BG:biguanide, α -GI: α -glucosidase inhibitor, ND: not determined.

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Effects of Aerobic Exercise on Lipid Profiles and High Molecular Weight Adiponectin in Japanese Workers

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Abstract

Background The metabolic syndrome is characterized by the accumulation of several metabolic risk factors. It is important to improve physical activity and dietary habits to reduce the risk of cardiovascular disease in humans.

Methods The study participants participated in a weekly aerobic exercise program that included a session composed of a brief meeting, warm-up exercises, and primary exercises (low and high impact, stretch, muscle training, and cooling down). To evaluate the effect of this intervention we measured body fat composition, holding power, and quality of life assessment. Blood tests were also carried out before and every 3 months during the study.

Results Of the 37 participants enrolled in the exercise group, 31 (83.8%) completed the 12-week program. The control group consisted of 42 subjects, 36 (85.7%) of whom were available for follow-up at the end of the 12-week study period. In the exercise group, weight, body fat percentage, waist circumference, the World Health Organization quality of life 26 (WHO-QOL 26) score, triglyceride, total cholesterol, high density lipoprotein cholesterol and low density lipoprotein cholesterol had improved significantly at the end of three months. The high molecular weight adiponectin concentration of the participants in the exercise group increased during the 9-month period of the study, although this change did not reach statistical significance compared with pre-exercise.

Conclusion Aerobic exercise led to an improvement in body composition and lipid profiles. High molecular weight adiponectin concentrations tended to improve compared with pre-aerobic exercise levels.

Key words: aerobic exercise, high molecular weight (HMW) adiponectin

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Introduction

The metabolic syndrome is characterized by the accumulation of several metabolic risk factors, such as abdominal obesity, dyslipidemia, hypertension, glucose intolerance, and prothrombotic and proinflammatory states (1-5). It is well known that patients with the metabolic syndrome have an increased risk of cardiovascular disease (6). Recently, the prevalence of patients with the metabolic syndrome has increased in Japanese workers. According to the International Diabetes Federation (IDF) and the National Cholesterol Education Program (NCEP) III criteria, the prevalence of the

metabolic syndrome in Japanese workers is reported to range from 25.8% to 33.0% (7).

It is important to improve physical activity and dietary habits to reduce the risk of cardiovascular disease in humans. Several earlier studies have shown that the beneficial effects of aerobic exercise on blood pressure, cholesterol levels, and insulin sensitivity occur regardless of whether weight loss is achieved or not (8, 9). In fact, the Pawtucket Heart Study group reported there is a close relationship between physical activity and the levels of high density lipoprotein (HDL) cholesterol (10). A study in 3,000 adult Japanese men also showed that the frequency of physical activity correlated positively with HDL cholesterol levels (11).

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The aims of the present study in Japanese workers were to assess the effects of long-term aerobic exercise on lipid profiles, glucose levels, and plasma high molecular weight (HMW) adiponectin, an anti-atherosclerotic adipokine.

Materials and Methods

Participants

Participants were enrolled in the study using newspaper and radio advertisements, and pamphlets. A total of 79 subjects aged 28-76 years (21 men and 58 women) were enrolled in the intervention group.

According to the Japanese diagnostic criteria, the metabolic syndrome is defined as a waist circumference of at least 85 cm in men, or 90 cm in women, plus at least two of the following characteristics: 1) triglycerides ≥ 1.69 mmol/L (150 mg/dL) or HDL cholesterol < 1.03 mmol/L (40 mg/dL), 2) systolic blood pressure ≥ 130 mmHg or diastolic blood pressure ≥ 85 mmHg, and 3) fasting plasma glucose ≥ 6.11 mmol/L (110 mg/dL) (12). The exclusion criteria in this study were a history of cardiovascular diseases, other serious illnesses, and type 1 diabetes mellitus. After the participants were asked about their history of physical and psychiatric illnesses, a physical examination was carried out on each participant.

The consent forms explained the purpose of this study, confidentiality of data, the possibility of declining to participate, and the contact numbers of the researchers. Documents containing explanations and precautions, and consent forms were distributed to the participants to obtain their written permission before the survey. They obtained approval the written informed consent from 79 subjects in total. The study protocol was submitted to and approved by the Institutional Review Board (IRB) of the Faculty of Medicine at Saga University.

Intervention

The exercise program was undertaken 1 day each week for 3 months or more up to a maximum of 18 months. The three-month course therefore consisted of a total of 12 sessions. Each session was of 1.5 hours duration and consisted of a brief meeting (10 minutes), warm-up exercises (5 minutes), primary exercises (30-35 minutes), stretch exercises (10 minutes), muscle training (25 minutes), and cooling down (5 minutes). Participants were assigned training ranges using a pre-established heart rate equivalent to 70% to 85% of their maximum heart rate (13).

Physical assessment

Physical assessment including weight, body mass index (BMI), body fat percentage (% body fat) was performed for each participant before the aerobic exercise program and 3 months later using the TANITA TBF-305 (Tanita, Tokyo, Japan) body fat/composition monitor. Waist circumference was measured at the navel with the subject in the erect position

after relaxed breathing. Duplicate measurements of holding power of the left and right hand were recorded using a grip dynamometer, and the average of the values recorded. During these measurements, the subjects were requested not to move the dynamometer.

QOL assessment

We evaluated the participants' quality of life using the World Health Organization Quality of Life scale (WHO-QOL) (14). The 26-item short form of the WHO-QOL is the brief version of the WHO-QOL 100, which was developed to assess subjects around the world, regardless of culture or local customs. It consists of 26 items classified into the following five domains: physical domain, psychological domain, social relationships, environmental domain, and general QOL. We evaluated the QOL assessment before the course and after three months of aerobic exercise.

Blood tests

The levels of triglyceride, total cholesterol, HDL cholesterol, low density lipoprotein (LDL) cholesterol, and fasting plasma glucose were measured during the study. Plasma HMW adiponectin level was measured using a sandwich ELISA kit (Fujirebio, Tokyo, Japan) that incorporated a monoclonal antibody to human HMW adiponectin, IH7 (15). A working standard of HMW adiponectin was prepared using human HMW adiponectin purified by passage through a Geratin-Cellulofine affinity column (Seikagaku Industrial Co., Tokyo Japan). The sensitivity and upper limit of the working range of HMW adiponectin levels were 0.18 to 22.05 $\mu\text{g/mL}$. The intra- and inter-assay variances were 2.4 to 3.0% and 4.2 to 5.1%, respectively.

Statistical analysis

The data were expressed as the mean \pm standard error (SE). The Chi-square test and Mann-Whitney U test were used to compare the characteristics of the two groups. The Wilcoxon signed-rank test was used to compare the values before the program and after three months of aerobic exercise. A two-way repeated measures analysis of variance (ANOVA) (aerobic exercise duration \times gender) was used to compare the values at 3, 6, 9, 12 and >12 months between the group performing exercises and pre-exercise. Pearson's correlation analysis and multiple regression analysis to examine the relationship between HMW adiponectin and the other factors and the Mann-Whitney U test was used to compare HMW adiponectin concentrations at 3, 6 and 9 months. The Statistical Package for the Social Sciences (SPSS, SPSS Japan Inc., Tokyo, Japan) software version 17 was used for the statistical analyses, with statistical significance being set at p values < 0.05 .

Results

Subjects

Thirty-seven subjects (10 men, 27 women, 73.0% women) who responded to the advertisement for participation in the present study were selected as the intervention group. We include 42 subjects as controls (11 men, 31 women, 73.8% women) who were matched to the subjects in the intervention group.

In the exercise group, 2 participants had a history of depression, 3 were dyslipidemia, and 3 had the metabolic syndrome. In the control group, 2 participants had a history of depression, 3 were dyslipidemia and 2 had the metabolic syndrome. The data were analyzed by the Chi-square test in order to confirm that the two groups were well matched and

that our hypotheses were tenable ($p=0.539$).

Adherence to aerobic exercise

Of the 37 participants in the exercise group, 31 (83.8%) completed the 12-week program (8 men, 23 women, mean age 45.5 ± 2.2 years, 74.2% women, mean BMI 23.5 ± 0.7 kg/m²), while 36 in the control group (85.7%) were available for follow-up at the end of the 12-week study period (10 men, 26 women, mean age 45.8 ± 1.2 years; 72.2% women, mean BMI 22.4 ± 0.4 kg/m²) (Table 1). The attendance rate for the aerobic exercise program ranged between 43% to 84% for each period.

Effect of exercise training on outcome variable

In the exercise group, weight, % body fat, waist circumference, WHO-QOL 26 score, triglyceride, total cholesterol, HDL cholesterol and LDL cholesterol had improved significantly by the end of the third month (Table 2). Of the 12 variables measured in the aerobic exercise group, (5 body composite variables, WHO-QOL 26 score, and 6 blood test variables), 4 variables improved significantly (Fig. 1). The aerobic exercise caused significant improvements in weight (men; $F=3.766$, $p=0.0152$, women; $F=3.834$, $p=0.0083$), waist circumference (men; $F=4.400$, $p=0.0075$, women; $F=2.830$, $p=0.0335$), WHO-QOL 26 score (men; $F=7.080$, $p=0.0005$, women; $F=6.120$, $p=0.0004$), and HDL cholesterol (men; $F=5.840$, $p=0.0017$, women; $F=3.732$, $p=0.0095$).

Correlation with HMW adiponectin

As shown in Table 3, there was a significant negative correlation between HMW adiponectin and body composition (BMI; $r=-0.509$, $p=0.037$), LDL cholesterol ($r=-0.578$, $p=0.015$), and fasting plasma glucose ($r=-0.559$, $p=0.020$). In

Table 1. Baseline Characteristics of Participants

Variables	Exercise group	Control group	p
n	31	36	
Men/Women	8/23	10/26	0.539 ^a
Age (year)	45.5 ± 2.2	45.8 ± 1.2	0.934 ^b
Height (cm)	161.9 ± 1.4	160.4 ± 0.9	0.368 ^b
BMI (kg/m ²)	23.5 ± 0.7	22.4 ± 0.4	0.189 ^b
% body fat (%)	26.0 ± 1.2	26.6 ± 1.1	0.708 ^b
Waist circumference (cm)	84.6 ± 2.0	80.6 ± 1.3	0.095 ^b
Weight (kg)	62.1 ± 2.2	58.5 ± 1.2	0.497 ^b

Values are expressed as means \pm SE, a, using Chi-square test, b, using Mann-Whitney U test, BMI, body mass index, body fat percentage, % body fat.

Table 2. The Effects of Aerobic Exercise on the Exercise Group and Control Group during 3 Months

	Exercise group (n=31)			Control group (n=36)		
	Pre	3 months later	p	Pre	3 months later	p
Weight (kg)	62.1 ± 2.2	60.8 ± 2.1	0.001 *	58.5 ± 1.2	57.5 ± 1.1	0.381
BMI (kg/m ²)	23.5 ± 0.7	23.2 ± 0.7	0.249	22.4 ± 0.4	22.3 ± 0.5	0.825
% body fat (%)	26.0 ± 1.2	25.1 ± 1.2	0.008 *	31.3 ± 0.7	29.5 ± 1.0	0.169
Waist circumference (cm)	84.6 ± 2.0	80.1 ± 1.8	0.001 **	80.6 ± 1.3	81.1 ± 2.0	0.183
Left holding power (kg)	30.6 ± 1.9	31.3 ± 2.0	0.329	30.8 ± 1.7	31.0 ± 1.9	0.945
Right holding power (kg)	33.2 ± 1.9	33.5 ± 1.9	0.455	31.9 ± 1.7	32.1 ± 1.8	0.455
WHO-QOL 26 score	2.9 ± 0.1	3.1 ± 0.1	0.001 **	2.9 ± 0.1	2.9 ± 0.1	0.878
Triglyceride (mg/dL)	135.3 ± 14.5	121.5 ± 19.4	0.019 *	110.1 ± 8.7	107.7 ± 8.7	0.523
Total cholesterol (mg/dL)	210.8 ± 6.3	194.7 ± 5.5	0.002 **	217.1 ± 5.8	217.4 ± 5.9	0.600
HDL cholesterol (mg/dL)	61.0 ± 3.0	71.8 ± 2.9	0.001 **	70.0 ± 2.2	72.3 ± 2.4	0.080
LDL cholesterol (mg/dL)	119.7 ± 5.7	112.9 ± 4.9	0.037 *	122.1 ± 5.1	120.8 ± 5.0	0.768
Fasting plasma glucose (mg/mL)	97.1 ± 4.5	95.2 ± 2.4	0.931	96.9 ± 3.7	102.9 ± 3.7	0.073

Values are means \pm SE. * $p<0.05$ ** $p<0.005$, using Wilcoxon signed-rank test. BMI, body mass index, body fat percentage, % body fat.

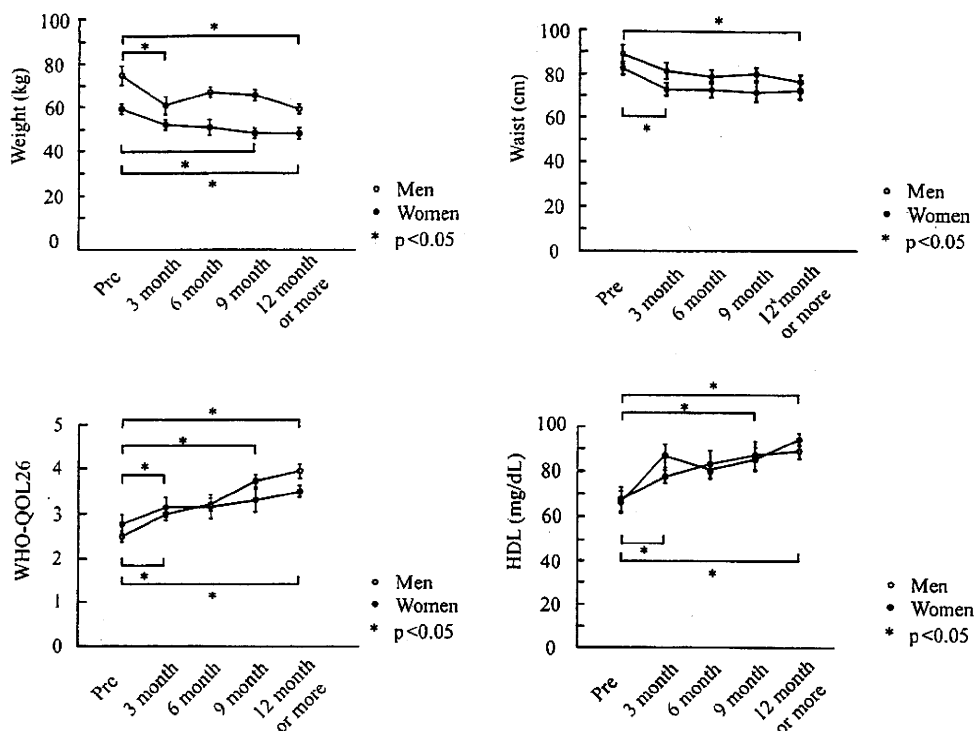


Figure 1. Changes in body composition and blood with the exercise group. Values are means \pm SE. * $p < 0.05$, using two-way repeated measures analysis of variance (ANOVA). Numbers of men were as follows: pre, (n=8) 3 months, (n=8), 6 months, (n=8), 9 months, (n=7), 12 months or more, (n=5). Numbers of women: pre, (n=23), 3 months, (n=23), 6 months, (n=20), 9 months, (n=17), 12 months or more, (n=11).

Table 3. Pearson's Correlation Analysis and Multiple Regression Analysis of HMW Adiponectin and Other Factors

	Pearson's correlation analysis (n=17)		Multiple regression analysis (n=17)	
	Pearson's Y	p	β -values	p
BMI	-0.509	0.037 *	-0.174	0.018 *
% body fat	-0.031	0.907	-0.088	0.453
Waist circumference	-0.180	0.488	0.101	0.244
WHO-QOL26	0.207	0.426	0.040	0.213
Triglyceride	-0.093	0.722	0.024	0.361
Total cholesterol	-0.309	0.228	0.014	0.114
HDL cholesterol	0.665	0.004 **	0.389	0.002 **
LDL cholesterol	-0.578	0.015 *	-0.443	0.008 *
Fasting plasma glucose	-0.559	0.020 *	-0.306	0.010 *
R ²				0.761
Adjusted R ²				0.454

Values are means \pm SE. * $p < 0.05$, ** $p < 0.005$, using Pearson's correlation analysis and multiple regression analysis. R² = coefficient of determination. BMI, body mass index, body fat percentage, % body fat.

contrast, there was a significantly positive correlation between HMW adiponectin and HDL cholesterol ($r=0.665$, $p=0.004$). There was no relationship between HMW adiponectin and WHO-QOL 26 score, triglyceride, total cholesterol levels, % body fat, and waist.

Multiple regression analysis examined the relationship between HMW adiponectin and the other factors. There was a significant correlation between HMW adiponectin and body composition (BMI; $\beta=-0.174$, $p=0.018$), HDL cholesterol ($\beta=0.389$, $p=0.002$), LDL cholesterol ($\beta=-0.443$, $p=0.008$),

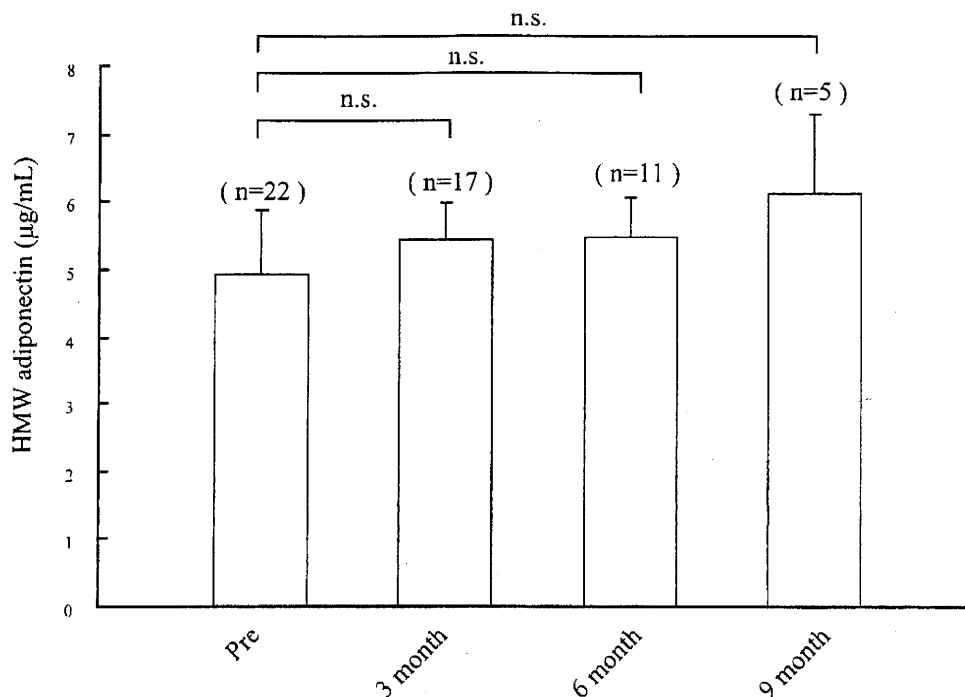


Figure 2. Changes in HMW adiponectin responses with the exercise group during the exercise and post exercise. Values are means \pm SE. n.s., $p > 0.05$, using the Mann-Whitney U test. Numbers of participants were as follows: pre, (n=22), 3 months, (n=17), 6 months, (n=11), 9 months, (n=5).

and fasting plasma glucose ($\beta = -0.306$, $p = 0.010$, Coefficient of determination $R^2 = 0.761$, and adjusted $R^2 = 0.454$). There was still no relationship between HMW adiponectin and WHO-QOL 26 score, triglyceride, total cholesterol levels, % body fat, and waist.

Adiponectin responses

The concentration of HMW adiponectin increased in the exercise group, although the difference between pre- and post-exercise levels did not reach statistical significance (Fig. 2). The HMW adiponectin concentration was increased by 24% after 9 months of exercise compared with pre-exercise levels.

Discussion

Aerobic exercise improved body weight, waist circumference, WHO-QOL 26 score, and HDL cholesterol. The concentration of HMW adiponectin increased during the aerobic exercise program, with a significant negative correlation being observed between HMW adiponectin and body composition (BMI). HMW adiponectin also showed a significant positive correlation with HDL cholesterol and a significant negative correlation with LDL cholesterol. We found that the 31 (83.8%) participants who completed the exercise program had significant improvements in weight, % body fat, waist circumference, WHO-QOL 26 score, triglyceride, total cholesterol, HDL cholesterol and LDL cholesterol at the end

of the third month. These findings are in agreement with a previous study on endurance exercise training that reported positive changes in lipid and lipoprotein metabolism (16).

It is generally considered that aerobic exercising has several beneficial effects on health. For example, regular exercise may promote chronic positive effects such as an improvement in lipid profiles, insulin resistance, BMI, and % body fat, as well as basal metabolic state (17). As the metabolism of lipoproteins occurs mainly during the aerobic exercise (18), the positive changes in anthropometric variables observed in the present study indicate that periodical aerobic exercising has the potential to improve the lipid profile. The pathological changes in the lipid and glucose metabolism in metabolic syndrome are closely related to the state of insulin resistance, unfortunately we have no data of fasting insulin concentration (IRI); further studies are needed to rectify the relation between IRI and exercise.

A loss of body mass and fat has also been associated with decreases in total and LDL cholesterol and an increase in HDL cholesterol. The improvement in total cholesterol may result from the exchange of cholesterol esters between tissues and lipoproteins to HDL cholesterol. Furthermore, exercise training usually decreases the concentration of fasting plasma triglycerides. As a consequence, the levels of very low density lipoprotein (VLDL) decrease and HDL cholesterol levels tend to increase (19). It is considered beneficial to increase the clearance of VLDL and triglyceride, in order to decrease the mean residence time of these lipoproteins in

the circulation. The concentration of LDL cholesterol is regulated by the balance between synthesis in the liver and removal from the plasma by lipoprotein receptors, while HDL concentration is determined by both HDL cholesterol and apolipoprotein A-I (apoA-I) concentrations. HDL cholesterol concentration increases frequently in response to a decrease in triglyceride, although in this study exercise training did not change the triglyceride levels. Therefore, another possible mechanism for the exercise-induced rise in HDL cholesterol rise we observed may be induction of apoA-I synthesis. There is further evidence that lecithin and cholesterol acyltransferase (LCAT) activity are changed by exercise training, and may therefore also affect HDL cholesterol levels before and after exercise training (20-22).

In this study we showed that continued exercise training led to further improvements in weight, waist circumference, WHO-QOL 26 score and HDL cholesterol levels (Fig. 1) while the other variables remained stable. We also demonstrated that HMW adiponectin correlated positively with HDL cholesterol, and negatively with LDL cholesterol and fasting plasma glucose. It has been reported that HMW adiponectin is not only the more active form of the adipokine (23, 24), but is also related closely to insulin sensitivity in the metabolic syndrome (25, 26). The present study investigated the role of aerobic exercise and improvement in lipid profiles in relationship to changes in HMW adiponectin concentration. Blüher et al (27) found that HMW adiponectin concentration increased with exercise treatment even in subjects with normal glucose tolerance. In contrast, Bobbert et al (28) showed that HMW adiponectin concentration was similar before and after 6 weeks of marathon training without a reduction in body weight. In the present study, HMW adiponectin concentration increased in the exercise group, although this increase did not reach significance during the aerobic exercise program (Fig. 2). The effect of aerobic exercise on HMW adiponectin concentration therefore remains to be established conclusively. However, HMW adiponectin concentrations tended to be higher than in the pre-exercise period. Further studies are needed to determine whether HMW adiponectin concentration changes significantly during longer periods of aerobic exercise or with different intensity of exercises.

Conclusion

Aerobic exercise leads to an improvement in body composition and lipid profile. The concentration of HMW adiponectin also showed a tendency to improve with regular aerobic exercise compared with pre-exercise levels.

The authors state that they have no Conflict of Interest (COI).

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HIV prevention through extended education encompassing students, parents, and teachers in Japan

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Abstract

Objectives We developed an extended HIV prevention program for students, parents, and school teachers, and then evaluated its effectiveness.

Methods The participants were 490 students, aged 13–14 years, attending four public junior high schools in Saga Prefecture, Japan. They were divided into two groups: control and intervention. All the students received group education by health professionals. In the control group, students received only two group education sessions given by health professionals. In the intervention group, there were three intervention components: parent education, teacher education, and student individual counseling by health professionals. Before and 3 months after the intervention, participants underwent evaluation of their frequency of communication about AIDS with parents or teachers, their knowledge of HIV/AIDS, and attitudes to sexual intercourse, self-esteem, and high-risk behavior.

Results A total of 135 students (80 boys and 55 girls) from the intervention group and 236 students (115 boys and 121 girls) from the control group participated in the evaluation 3 months after intervention. Adolescents in the intervention group showed more positive changes than those in the control group from baseline to follow-up. Intervention had a significant impact on the frequency of

communication about AIDS with teachers ($p = 0.027$) and HIV/AIDS knowledge among females ($p = 0.023$), and intervention also had a significant impact on refusal of sexual activity by males ($p = 0.045$).

Conclusions These findings suggest that effective prevention of HIV might be achieved by an expanded education program for students and teachers such as that described, and individual counseling that takes into consideration the sexual differences of Japanese adolescents.

Keywords HIV prevention · Parent · Teacher · Adolescent · Japan

Introduction

Japan has the most rapidly increasing number of AIDS patients among developed countries. The total number of HIV-infected persons in Japan, including those with AIDS, was 13,894 at the end of 2007, including 1,680 adolescents and young adults aged ≤ 25 years, and the annual number of young persons with new HIV infection has risen from 47 in 1998 to 131 in 2007 [1]. Although individual counseling about prevention is provided at the time of HIV testing, the percentage of teenagers who undergo such testing is low. Based on the results of a 2005 survey by the Japanese Association for Sex Education [2], there has been a sharp increase in the numbers of Japanese teenage boys and girls with sexual experience, from 3.6 and 4.2% among early teenagers (aged 13–15 years) to 26.6 and 30.0% among late teenagers (aged 16–18 years), respectively. Accordingly, preventive education about HIV is important for early teenagers in Japan before they begin sexual activity. However, preventive education about HIV for young people is not carried out proactively in Japan at present.

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In the United States, the time of starting sexual activity was reported to depend on age, gender, race/ethnicity, socioeconomic status, religion, and the parent-child relationship. A relationship between the initiation of sexual activity by teenagers and parental child-rearing policies has been clarified [3]. In Japan, negative feelings about discussing sexual activity with teenagers and discomfort among Japanese parents and school teachers about taking part in investigations have resulted in fewer studies of teen sexual behavior and parent-adolescent relationships [4]. A survey of Japanese high school students in their late teens showed that parental supervision of children aged 16 or younger, parental disapproval of sexual behavior, and communication with parents about AIDS delayed the start of sexual activity by adolescents [5]. Other surveys performed in Japan have shown that sexual behavior among girls in their late teens is influenced by the "relationship between parents" and the "parent-adolescent relationship", whereas eating habits, dating partners, friends with sexual experience, and smoking and drinking influence both boys and girls [6]. Based on international and Japanese data for late teenagers, factors influencing the sexual behavior of early teenagers in Japan may include the family, school, friends, and partners.

Saito et al. [7] have pointed out that Japanese parents and teachers did not receive appropriate sex education when they were adolescents and often do not possess accurate knowledge about sexuality. In addition, the opportunities to learn about sexuality are limited during teacher training courses in Japan, although there are some exceptions. This results in a large number of teachers who have insufficient knowledge about sex education [7]. Tanomura [8] has reported that university-level teacher training courses in Japan provide education about sexual psychology, physiology, sexual health, and medical care as a special course, but few instructors who have specialized in sex education are available to provide education on this topic to university students. Therefore, many students receive little sex education when they are at university before becoming teachers, and thus have to acquire sex education skills and implement programs without assistance. Accordingly, sex education is still confused and at the trial-and-error stage in Japan [8].

With regard to preventive education about HIV in particular, students in their early teens receive little information from their families or junior high schools in Japan. A typical HIV education program provides basic knowledge by lecturers given in the third grade of junior high school, and the health and physical education teachers are usually responsible for HIV education. Because these teachers have the primary duty of teaching physical education and health, the time available for sex education is limited and the teachers cannot provide

adequate HIV education. Tanomura [8] has indicated that training workshops for teachers are needed, which should be strengthened by educational support through the local community at each school so that such workshops can play an active role.

In 1999, the Japanese Ministry of Education, Culture, Sports, Science and Technology recommended "Cooperation between Schools and Pertinent Organizations/Community" in "The Concept and Approach of Sex education in Schools". Since then, junior high schools have often asked medical professionals to provide lectures for their students. However, it has been pointed out that some medical professionals provide education without sufficient understanding of the circumstances of adolescents or are unable to cooperate with the school adequately. In addition, the educational effect of a one-off lecture without evaluation is unknown [9]. Furthermore, Hasuo [10] has stated that sex education should not be managed by a gynecologist alone, and sex education lectures should not be the only method of sex education provided to junior high and high school students. Instead, sex education should involve parents at home; teaching staff at schools; and nurses, midwives, health nurses, gynecologists, and urologists from the medical field [10].

Until now, various HIV education programs have been created based on the Information-Motivation-Behavioral skills model, social recognition theory, and the life skills model. However, Wright [11] has pointed out that uniform group education for students has little effect as a strategy for reducing the incidence of pregnancy and sexually transmitted diseases (STDs). Intervention to prevent HIV and AIDS among adolescents did not achieve the goals of increasing HIV and AIDS knowledge, changing attitudes, improving negotiation and communication skills, or influencing positive behavior such as consistent condom use, abstinence, or reducing the number of sexual partners [12]. Ingram et al. [13] selected five evidence-based HIV prevention programs [14-18]. The programs were similar in a number of ways. Each program: (1) targeted adolescents or preadolescents; (2) focused on reduction of sexual risk behavior; (3) was delivered in small-group formats for 5-30 adolescents; (4) was delivered with ethnic minority populations; and (5) included multiple sessions (from 7 to 20 sessions). All programs were skill-focused and utilized cognitive-behavioral principles. These programs selected safer choices [14] for school-based programs that included HIV prevention. We believe that multiple behavioral interventions based on social recognition theory are necessary for early adolescents to reduce the risk of HIV transmission in Japan.

Of note, some studies have revealed that the risk of contracting STDs is lower for students with a high level of self-esteem. Salazar et al. [19] reported that females with a

higher level of self-esteem participated in frequent communication with their parents and their partners, and that they were able to discuss condom use with their partners when they had sex. In addition, Denny and Young [20] reported that students who attended classes designed to delay sexual activity by focusing on improvement of self-esteem commenced sexual activity at a later age in comparison to those who did not attend such classes. These reports suggest that programs to promote the self-selection of safe behavior may be useful for students with a high risk of pregnancy or STD, in order to improve their self-esteem. Also, recent Japanese studies have shown that young people with someone to consult have higher self-esteem than young people without someone to consult [21]. We consider it essential to recognize the importance of self-esteem and self-protection for selecting safe HIV prevention strategies. However, the frequency of communication with parents decreases among adolescents. In particular, speaking with parents about sex and HIV is rare in Japan, and adolescents also have few people to consult to share their sex-related concerns [4, 5]. Therefore, to improve the self-esteem of young Japanese, we consider it important for intervention to increase their communication with parents and also to provide a chance for them to consult health professionals about concerns which they cannot express to other people. Furthermore, a new public health approach for the prevention of HIV/AIDS in Japan has indicated that HIV should be recognized as "a disease that anyone can catch". As such, multiple interventions are recommended to promote individual health as well as to contribute to public health [22]. Accordingly, we consider that various HIV prevention programs should be developed as soon as possible in consideration of both overseas findings and the Japanese cultural and educational environment.

The objective of our program is to prevent an increase in the number of Japanese young people with HIV infection. This program was designed to delay the initiation of sexual activity among Japanese junior high school students in their early teens. To achieve this objective, we prepared an education program on the prevention of HIV infection which is provided at school for 2 years to Japanese junior high school students who have not already had sex. This program has been prepared to target factors that influence the sexual behavior of young adolescents through education by parents and school teachers, with support by health professionals. It is based on the concept model of self-esteem and social cognitive theory, and consists of three components, which are parent education, teacher education, and student individual counseling by health professionals. The objective of our study was to evaluate the effectiveness of this extended education program.

Methods

Participants

The participants were students attending four public junior high schools located in Saga Prefecture, Japan, which has a population of 866,000 and an area of 2,439 km². The schools were selected at random, with two schools each for the control group and the intervention group. A survey of all students was conducted anonymously by questionnaire on two occasions between December 2007 and December 2008. The first survey was conducted in December 2007. Intervention involved 2 grades (among junior high schools)—second grade from December 2007 to March 2008 and third grade from April 2008 to July 2008. The follow-up survey was conducted in December 2008. There were a total of 490 students at the four participating schools in the second year of junior high school who were aged 13–14 years. There were 298 students at the schools providing the control group and 192 students at the schools supplying the intervention group.

Program procedure

The schools belonging to the intervention group are listed in Table 1. The procedures for intervention and control schools are outlined in Fig. 1. Group education by health professionals was provided for students in both the intervention and control groups.

Intervention group

The three intervention components (see Table 1) were parent education, teacher education, and student individual counseling by health professionals.

Parent education

The objective of parent education was to improve the self-esteem and self-protection of young people by helping their parents understand the changes affecting their children during puberty and how to cope with them.

Education for parents A midwife, a gynecologist, and two school nurses provided training for parents/guardians before assigning homework that involved both parents and students.

Homework assignments for parents and students Assignments were completed at home to improve communication between parents and students. School nurses gave the students the homework assignments.

Table 1 Characteristics of the three intervention components (two junior high schools, six classes, $n = 192$)

Purpose	Role	Instructors	Receiver	Grade	Education conditions
<i>Parent education</i>	Education for parents	Two school nurses	Parents		Two times, one session, 60 min
		A midwife	(Mother)	Second	Physical and emotional changes during puberty; pregnancy, childbirth, childcare, and HIV/AIDS prevention
		A gynecologist	$n = 60$	Third	The importance of communication with children and the parent response to inculcating self-esteem among young people
			$n = 60$		
<i>Improving the self-esteem and self-protection of young people by helping their parents understand the changes affecting their children during puberty and how to cope with them</i>	Homework assignments	Two school nurses	Parents and students		<ul style="list-style-type: none"> ① How was your state when you were born or when you were a child? ② What do your parents or guardian like about you? ③ What do you like about yourself? ④ What do you and your parents or guardian like about your friends? ⑤ How do you get along with your friends? ⑥ Have your parents felt that your life is important, such as when you were born or when you got sick or hurt, and when have they felt this? ⑦ Let's think about infection routes with your parents ⑧ An effective drug to eliminate HIV does not exist. How do you and your parents feel about this? ⑨ What risks are there in associating with someone older than you are?
			$n = 159$	Second	
			$n = 153$	Third	
<i>Teacher education</i>	Education for teachers	Two school nurses	Class teachers		Two times, one session, 60 min
		A midwife	$n = 12$	Second	Physical and emotional changes during puberty; pregnancy, childbirth, childcare, and HIV/AIDS prevention
		A gynecologist	$n = 12$	Third	The importance of communication with children and the teacher response to inculcating self-esteem among young people
					The purpose and method of small-group discussion
		Twelve class teachers	Students		Two times, one session 50 min
			$n = 184$	Second	Sexual relations among students of the same age
			$n = 180$	Third	Sexual relations with an older partner
		A midwife	Students		Two times, one session 50 min
		A gynecologist	$n = 185$	Second	Physical and emotional changes during puberty; pregnancy, childbirth, and childcare
			$n = 182$	Third	HIV/AIDS prevention
		Two school nurses	Students		One-two times, 30–20 min
		A midwife			The students who had questions and worries about education on four forms
		A gynecologist	$n = 30$	Second	We used the forms filled out after each education session and essays written by students after the education session
			$n = 32$	Third	
<i>Student education</i>	Group education				
	Individual counseling				
<i>Providing knowledge about HIV and sex to students, improve their self-esteem by answering questions and alleviating concerns, and providing them with a careful attitude toward sexual activity</i>					