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Characteristics of Marshallese with Type 2 Diabetes on Oahu: A Pilot Study to Implement a Community-Based Diabetic Health Improvement Project

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Abstract

Objectives—To determine the feasibility of a resident physician-based, culturally appropriate method of decreasing the disease burden of Type 2 Diabetes Mellitus (DM2) in a group of Pacific Islanders, Marshallese living in Hawai'i.

Methods—Thirty one Marshallese with diabetes who live on the island of Oahu, Hawaii were recruited. Baseline health status of the participants was characterized. Health parameters included HgbA1c, random blood sugar (RBS), lipid panels, body mass index (BMI), blood pressure, and medical history, along with qualitative information. A focus group was held with participants prior to beginning the curriculum to determine cultural views on diabetes, health, treatment, and to identify potential obstacles to health improvement. A DM2 educational curriculum culturally relevant to Marshallese populations was then started, including instruction in lifestyle modification, adherence to medication regimens, and planned quarterly assessment of health improvement.

Results—Baseline quantitative analysis revealed Marshallese with diabetes to be obese and hyperglycemic, with average BMI of 30 kg/m^2, RBS of 285, and HgbA1c of 9.3. Qualitative analysis revealed that nearly half the participants admitted to symptoms of severe hyperglycemia. The initial focus group had a substantial turnout. Attendance rapidly declined, becoming so low that classes were eventually terminated. However, in two participants who attended more than three classes there was evidence of major improvements in HgbA1c, cholesterol, and qualitative markers, which were sustained after one year.

Conclusions—This pilot study of Marshallese with diabetes on Oahu showed that the majority had poor glycemic control with secondary co-morbid conditions. Although many barriers exist for successful implementation of a diabetes health improvement project in this group, the groundwork for translation of this project to the Republic of Marshall Islands (RMI) has been laid; curriculum translation and patient recruitment is currently underway to advance the project.

Keywords

Diabetes; Community-based Health Improvement; Marshallese; Hawaii

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Background

The current global epidemic of Type 2 Diabetes (DM2) has disproportionately affected non-white populations, particularly members of relatively isolated indigenous groups that have rapidly industrialized. The increased rates of DM2 in such populations has been well documented, and ascribed to the combination of genetics favoring food storage and environmental change involving increased consumption of fat and total calories (Mau, Grandinetti, Arakaki et al., 1997).

The incidence of diabetes is clearly linked to obesity (and its accompanying increased insulin resistance) and sedentary lifestyle. It has been shown that for each kilogram increase in body weight, DM2 risk increases by about nine percent (Mokdad et al., 2000). The Nurses Health Study found that women who engaged in vigorous physical activity, at least once a week, had a significantly lower risk of developing DM2 than those who exercised less frequently and with a lower intensity (Hamdy, Goodyear, and Horton, 2001). This study also found that in a subset of women with DM2, who increased physical activity, had a substantial reduction in cardiovascular events. A long-term study conducted at the University of Pennsylvania, which tracked the health of former college students, showed that physical activity was inversely correlated with risk of developing DM2 over a 15-year period (Helmrich et al., 1991). Hence, patients who modify their lifestyle with a balanced diet and exercise reduce the risk of developing DM2.

Studies in athletes as well as those on a very low calorie diet showed reduction in insulin resistance related to physical activity and weight loss (Wing et al., 1991). Hamdy et al. (2001) noted that with weight loss, there can be as much as a 165% improvement in insulin resistance. Some investigators have noted lower glycosylated hemoglobin levels and improvements in serum lipid profiles associated with physical training. However, the increase in insulin sensitivity with exercise seems to diminish with time and is lost after six to seven days without exercise, highlighting the need for a sustained lifestyle change (Gumbiner, 1999). Although physical activity alone does not seem to create or sustain significant weight loss, it increases dietary success, and has independent benefits in terms of cardiovascular fitness and psychological well-being.

Hawaii's Pacific Islanders and Native Hawaiians have high prevalence rates of DM2, which seem to correlate with degree of indigenous ethnicity (Mau et al., 1995). At the University of Hawaii Family Practice Residency Program's clinic, the Physician Center Mililani (PCM), we have close ties with the Republic of the Marshall Islands (Omori et al., 2004) and we see many patients from the Marshallese community, who come for annual health examinations or have migrated permanently to Hawaii. Anecdotally, many of the Marshallese patients seen at PCM have poorly controlled DM2 with presumably little understanding of its relation to lifestyle. They often present to the clinic with end stage diabetes, the result of inadequate control, requiring amputation, cardiovascular and/or retinal surgeries. Due to the complexity of the disease and of the Marshallese culture, our Family Practice Residents find themselves in the challenging role of health educators as well as health care providers to this underserved population.

The Republic of Marshall Islands (RMI) is a group of atolls in Micronesia that gained independence from the U.S. in 1986, and is now involved in a Compact of Free Association with the U.S. (Yamada and Palafox, 2001). Ruled by foreign powers since the nineteenth century, Marshallese lifestyle and diet have shifted from subsistence farming and reliance on the ocean to a Western, high-fat diet with an increasingly more sedentary lifestyle (for more background information, see Appendix A).

Data from the RMI Bureau of Health Statistics show that between 1996 and 2000, DM2 was listed as the leading cause of death, accounting for 30% of deaths. The economic and personal costs of this disease have been devastating to Marshallese families, with strokes, myocardial infarctions, end-stage renal disease, and extremity amputations due to DM2. Furthermore, a recent epidemiologic study showed that Ebeye, a very crowded island of the Kwajalein atoll, had a 20% prevalence of DM2, more than twice the U. S. prevalence rate (Yamada et al., 2004). That study suggests that 20% is likely an underestimation.

Studies have linked diabetes education efforts in residency programs and Health Maintenance Organizations (HMOs) with improvements in diabetes surveillance, control, and cost. One study showed that internal medicine residents who completed a diabetes education course were better at lipid screening, dietary recommendations, and utilizing FBS levels than their peers (Mazzuca et al., 1988). Sutherland et al. (2001) demonstrated that a residency program which utilized multi-modal diabetes care improvement initiatives had lowered HgbA1c level more than nearby clinical practices. Berg and Wadwha (2002) found that a diabetes management program resulted in a decrease in symptomatic hyperglycemia, increased rate of HgbA1c surveillance, and decreased inpatient admissions, when implemented in an HMO/PPO setting in Colorado.

Thus far, the literature has not shown a prospective cohort study using residents as educators for groups of diabetic patients, nor have such studies been performed with cohorts of Marshallese patients. This study is unique in both respects, focusing on diabetes care and serving those in underserved, understudied minority groups.

Methods

In this study, a curriculum for diabetes control involving calorie restriction, exercise, and adherence to medications was developed. The target study group was Marshallese living in Oahu who have diabetes. The curriculum was divided into 16 hour-long sessions given by family practice residents at PCM. The sessions were modeled after the Diabetes Prevention Program (DPP) Lifestyle Modification sessions, which focused on prevention with individual sessions. The focus of sessions in this curriculum deferred from DPP in that our target was DM2 control, and would be presented in a group setting. The curriculum included handouts from the DPP manual, as well as educational materials from the Hawaii Department of Health, and Wahiawa General Hospital. The curriculum covered several topics, including: 1) diet; 2) medications; 3) daily exercise; and 4) lifestyle modification. The use of food and exercise diaries was encouraged. All handouts were translated into Marshallese for those who are not fluent or literate in English.

Marshallese with DM2 were recruited through a PCM chart review, phone calls and direct inquiry by the study interpreter (who is active in the Marshallese community and in a local Marshallese church). An intake history and physical and baseline RBS were conducted prior to the start of sessions. Potential participants were excluded from the study if the intake exam revealed active coronary artery disease or severe peripheral vascular disease, including amputation. During this exam, participants read and signed a consent form, translated, if necessary, by an English-speaking relative. This consent form, approved by the University of Hawai'i Institutional Review Board, outlined the study and its potential risks, including myocardial infarction, hypoglycemia, and falls due to exercise.

Prior to beginning the curriculum, a focus group was held with 31 participants and their families, to address cultural beliefs and attitudes about DM2 and its relationship with food and activity. Potential barriers to health improvement were also discussed. This focus group was directed by the PI, a physician, assisted by a study co-investigator, a cultural anthropologist.

Ideas for focus group questions were influenced by prior focus groups conducted with patients with diabetes in RMI (Kaanoi, 2000). During the focus group, baseline lipid profiles and Hemoglobin A1C (HbA1c) levels were drawn. Follow-up lipid profiles, HgbA1c, and qualitative surveys were to be assessed at quarterly intervals up to one year, to assess for change during this educational intervention.

Results

Of the 31 Marshallese with diabetes initially enrolled, the average age was 50.4 years, with 12 males and 19 females. The oldest participant was 89 years old, the youngest was 35 years of age. The average BMI was 30kg/m^2, with a range from 21.8 to 44.7 (Table 1 and Appendix B). Average blood pressure was 159/77. The average fingerstick blood glucose (most participants were non-fasting) was 285 mg/dl, with an average HgbA1c of 9.3 % (Appendix B). Average values for Fasting Lipid Profile were as follows: Total Cholesterol (TC) 186, Triglycerides 173, HDL 30, LDL 129, TC/HDL 6.8 (Appendix B). Most participants (19/28 respondents), were on anti-diabetic medication, most commonly, a sulfonylurea or Metformin (9 each). Some (6) participants reported stopping medications, most often due to “running out” and not refilling, less commonly because of lack of health insurance coverage. The majority of participants knew they had DM2 for five years or less (17), with eight of those knowing they had DM2 for less than two years. Four participants were on anti-hypertensive medications. The percentage of those with self-reported DM-related conditions (as reported by the participants) were as follows: (0) had CAD (though many described intermittent episodes of chest pain), (2) had retinopathy, (1) had renal disease, (2) had peripheral neuropathy, and (1) had significant wounds or ulcers to their extremities. Twelve (12) participants reported themselves as being “good” or “fluent” in English, the remainder spoke little or no English, and required translation during the intake examination. Nine (9) participants had their own personal vehicle for transportation to the clinic, and the remainder relied on family/friends (14) or public transportation (2).

The qualitative survey focused on general emotional state/sense of well-being, adherence to medication regimen, exercise habits, changes in diet during the intervention, and physical health. Significant results of this survey are listed in Appendix C. Nearly half (47%) of the respondents admitted to symptoms of severe hyperglycemia. Also, while 48% said they took their anti-diabetic medication daily, 19% did not take their medication at all, with the remainder admitting to partial compliance with their regimens. The most common reason (38%) for not taking medication was “running out and not refilling,” with the next most common reason being a loss of health insurance combined with the prohibitive cost of prescription medication (24%). The majority (81%) of respondents felt that their daily activities were limited by fatigue or pain. The most common reason for overeating, or eating “unhealthy” foods was “hunger” (48%), followed by lack of taste/filling by “healthy” foods (29%), and prohibitive cost of “healthy” foods (14%). One third (33%) of respondents exercised (including walking) for at least 20 minutes daily during the previous week, 24% did not exercise at all, with remainder doing lesser amounts of exercise. The most common reasons for not exercising more, were “no time” (26%) and “no safe areas” (26%), followed by “too tired” (21%).

The focus group yielded some of the participants’ beliefs and attitudes regarding diabetes, health & illness, food & activity, and medications. Of note, diabetes was identified as a “glucose problem,” attributed to “God” and “radiation” (from the atomic testing and subsequent fallout). Diabetes-related bodily damage was identified as affecting the heart, kidney, vision, nerves, leading to decline in overall health, and possibly leading to amputation. Some of the problems in living with diabetes were noted to be “it affects the mind,” and difficulties in eating the “right foods” and exercising. “Bad” foods for a diabetic were stated to be: starch, salty food, sweets, fatty food, and white rice. “Good” foods were identified as: brown rice, diet Pepsi, and food

from the “three groups,” identified as “protective,” “energy,” and “high building foods.” Ways to manage diabetes were noted to be reducing food intake and eliminating sugar. Nearly all the participants admitted to eating “fast foods,” and only a few realized it was not good for their DM2. Many participants mentioned that rice “tasted good” and was “filling,” while vegetables were “expensive and not filling.” One participant felt that the program should give the participants money “to buy healthy foods.” Some participants stated that grilling was healthier than frying, and that “Marshallese foods,” like fish, breadfruit, and taro were healthier than “imported” foods, like rice and canned meats. Many participants were unclear as to what food items contained starch, and wanted instruction on this. Although all participants felt taking participants took herbal medication, such as *noni* (Morinda citrifolia), and extracts from *kirin* (sp. unidentified) tree. The biggest problems faced by Marshallese immigrants were stated by the group to be housing/high rent, insufficient finances to buy the “right foods,” and transportation. Diabetes was considered to be a significant problem by the group, in this context. Reasons to control diabetes and live longer and healthier were stated to be “spending more time with your family,” and “loving your body by keeping it healthy,” though one participant stated that it might be “good to die early and not have any more problems.”

Despite the poor turnout to the educational sessions, two of the participants who attended more than three sessions showed improvement in HgbA1c. In one of the participants, HgbA1c fell from 13.4% to 9.8% (a 27% reduction), with the latter value being drawn nearly nine months after the former, several months since the classes had been terminated. In this same participant, total cholesterol improved from 160 to 138 mg/dl, and qualitative improvements were made in reduction of consumption of starch, fat, & sugar, improved overall mood & energy level, and exercise frequency, as measured by the qualitative survey. This participant reported that, as a result of this project, he was motivated to apply for health insurance, and his dose of Metformin was increased by his physician as a result of his severely elevated random blood glucose and HgbA1c. In the other participant, HgbA1c was reduced from 8.7% to 7.4% (15% reduction) and total cholesterol dropped from 165 to 153 mg/dl. In this participant, follow-up qualitative demonstrated improvements in adherence to medication regimen (by refilling before running out), increased energy level, and reduced consumption of starch and sweets. Interestingly, in this patient, exercise frequency dropped slightly, although, due to early termination of classes, exercise was never discussed in the educational sessions.

Discussion

This pilot study characterized members of the Marshallese diabetic population on Oahu in various quantitative and qualitative ways. The participants in this study had BMI’s, HgbA1c’s, and FBG values that are much higher than an average group of diabetic patients in the U.S. This highlights the severity of obesity and DM2 in this group of indigenous people. This is likely related rapid industrialization and its accompanying high caloric diet and sedentary lifestyle. Perhaps the “thrifty gene hypothesis” accounts for the extreme insulin resistance found in these relatively isolated Pacific Islanders who, after centuries of a lean, fish-based diet and active lifestyle then have a rapid increase in their fat and calorie. However, this hypothesis may just provide a convenient biologically reductionist explanation of a complex sociological transition. The fact that most of the participants were recently (within five years) diagnosed, hints at a high rate of undiagnosed, relatively severe DM2 in this population. Another compounding baseline finding was that many of the participants had an elevated blood pressure yet were not on any medications for this.

The focus group revealed that many participants had some knowledge of the contributions of various food types and lack of exercise to DM2. However, as previously noted, they demonstrated a large component of “fatalism” and perhaps this fatalism, along with other compounding issues (transportation, job duties, and family obligations) resulted in the poor

turnout to the educational sessions. It was difficult to contact participants to ascertain reasons for the poor turnout; many had no telephone or gave an incorrect contact number, while others stated that the classes were interesting but were difficult to attend because of other obligations. Many agreed to come but never showed up, without clear reasons for their absence.

Some participants stated during the focus group that although they realized that white rice and fatty foods were not good for their health, they ate large quantities of both because they were "cheap and filling." This highlights the economic impact of expensive produce and cheap rice and canned meat on the health of these Marshallese with diabetes. This impact is even larger in the RMI, where wages are low and food prices relatively high. Perhaps governmental efforts by the U.S. as well as the RMI to reduce the price of fresh produce and other "diabetes-friendly" foods would be helpful in reducing the burden of this disease. Perhaps a partnering of the health Industry and NIH with food distributors/vendors to make healthier food choices more affordable would be in order during this epidemic of obesity and DM2.

The qualitative survey revealed that glycemic control was generally very poor in this group, as nearly half of the participants experienced signs and symptoms of severe hyperglycemia, and more than 80% had limited daily activities due to fatigue or pain. Despite this, none of the participants felt usually or always sad or discontented, perhaps signifying their acceptance of the condition. Hunger, taste, and price were listed, rather than psychosocial stressors, as the reasons for eating unhealthy foods.

Compliance with medication was also poor, with less than half of the participants taking their daily medication as prescribed for DM2, although many simply forgot to refill, nearly a quarter of participants stated that lack of insurance coverage and the prohibitive cost of prescription drugs was a significant barrier to compliance.

Exercise among the group was poor; nearly a quarter of participants did not exercise at all, while only a third exercised for at least 20 minutes a day (including walking). In addition to lack of time and physical fatigue, a lack of safe areas for exercise was cited. This factor was also cited during a DM2 focus group held in the RMI. Perhaps group walks at municipal parks could be arranged for these participants on Oahu, since there are likely many more safe areas to walk (i.e., free of dogs and automobiles) in Hawaii as compared to the smaller land mass in the RMI.

Although the planned intervention was not successful due to a lack of participant turnout for the educational sessions, a diabetes education curriculum was developed for this population, and part of it was translated into Marshallese. This helps lay the groundwork for future diabetes health intervention projects in Marshallese communities. Also, the finding that two of the participants who attended only a few sessions experienced improvements in HgbA1c, total cholesterol, dietary habits, and overall mood & energy level measured several months after termination of the sessions, is encouraging for future studies.

Presently, this pilot study is relocating to the RMI with the assistance of the RMI Ministry of Health, Public Health Department, and Health Education Department. The curriculum developed during this study is currently being translated, and will be used in an interventional cross-over study, using a matched group of "usual care controls." Participants and controls will be chosen from, and followed by the Joslin CDMP Online Disease management system, which has established a database of with diabetes in the RMI Public Health Clinic and provides remote access to participant databases.

During the current DM2 pandemic, it is vital that more culturally-based diabetic health improvement projects be established worldwide, particularly in areas of high DM2 prevalence and severity.

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Appendix A

Republic of the Marshall Islands at a Glance

Geography

1,225 coral atolls, islands and islets, having a mean height of seven feet above sea level, scattered over 750,000 square miles of the Western Pacific Ocean. Total land area is 70 square miles, 20% of which is uninhabitable due to former US nuclear testing or current military use.

The capital, Majuro, is located 7 degrees north of the equator midway between Hawaii and Guam.

Population

50,840 (1999 population census). Approximately half of the population live in Majuro, the region's capital, which is only 3.75 square miles, and about 20 per cent of the population (13,000) live in Ebeye, a 78 acre island located on the southwest corner of Kwajalein Atoll, the site of the U.S. Army's Kwajalein Missile Range. Majuro and Ebeye represent some of the world's highest population densities. Population growth is between 3% to 4%, and half of the population is below 15 years of age.

Language

Marshallese, an Austronesian language, is the official language.

Political status

A sovereign self-governing democracy in free association with the US. In 1989 the Compact of Free Association was signed which gave the Marshalls independence while ensuring US government funding for many of its programs.

In 1995, the RMI allocated 13% of its total budget to health expenditures, amounting to US$ 85 per capital. A significant portion of this is used for patient referrals to Hawaii and the Philippines.

Funding sources include United States Federal Health Grants and grants under the Compact of Free Association, the 177 Health Care Program for populations affected by nuclear testing (affected people and their descendants from the atolls of Rongelap, Utrik, Bikini and Enewetak), and bilateral donor grants sponsored by WHO, UNDP, UNICEF, and UNFPA.

Basic health services are provided at minimal expense to all Marshallese citizens by two hospitals, one each on Majuro and Ebeye, and by 49 health centers on outer atolls.

SOURCE: World Health Organization, Western Pacific Regional Office. http://www.wpro.who.int/chip/

Appendix B Lipid Profile (N=30)

ID	Total Cholesterol	Triglycerides	HDL	LDL	TC/HDL	HA1c
0	160	121	23	113	7	13.4
1	168	385	25	66	6.7	9.2
2	136	76	33	88	4.1	11.1
3	234	121	31	179	7.5	10.6
4	179	80	37	126	4.8	8.5
5	235	173	39	161	6	7.3
6	153	518	27	invalid	5.7	10
7	159	107	35	103	4.5	7.3
8	129	125	25	79	5.2	8.7
9	165	66	33	119	5	8.7
10	137	69	48	75	2.9	11.6
11	232	>1000	12	invalid	19.3	7.6
12	300	279	48	196	6.3	11.4
13	217	151	26	161	8.3	8.5
14	205	97	38	148	5.4	7.7
15	NA					
16	NA					
17	NA					
18	244	128	30	188	8.1	11.6
19	NA					
20	NA					

ID	Total Cholesterol	Triglycerides	HDL	LDL	TC/HDL	HA1c
21	NA					
22	129	552	18	invalid	7.2	7.7
23	191	132	22	143	8.7	7.4
24	NA					
25	209	124	32	152	6.5	6.3
26	NA					
27	NA					
28	196	153	26	139	7.5	8.6
29	139	76	22	102	6.3	9.5
30	174	109	30	122	5.8	11.8
Ave	186	173	30	129	6.8	9.3

Appendix C Qualitative Survey Results (N=30) (selected questions listed only)

	Survey Items	Percent
1.	What describes your mood most of the time?	
	a. Always happy or contented	18
	b. Usually happy or contented	27
	c. Sometimes happy or contented, sometimes sad or discontented	55
	d. Usually sad or discontented	0
	e. Always sad or discontented	0
2.	How often do you have blurry vision, frequent urination, excessive thirst, or readings over 300 on your blood sugar machine at home?	
	a. Daily	47
	b. More than 3 times a week	5
	c. Less than 3 times a week	5
	d. Almost never	26
3.	If you are on medication for diabetes, how often do you take your medication as prescribed?	
	a. Every day, I never forget	48
	b. Almost every day, I occasionally forget	19
	c. More than 3 days a week	16
	d. Less than 3 days a week	0
	e. I don't take my medicine at all	19
4.	If you don't always take your medicine, why not?	
	a. I ran out, and did not refill it	38
	b. I lost my insurance, and don't have enough money to pay for the medicine	24
	c. I don't like how I feel on the medicine	14
	d. I don't believe the medicine will help me	0
	e. Other	19
5.	When I wake up in the morning, I usually feel;	
	a. Very lively, full of energy	19
	b. Pretty lively, some energy	48
	c. Pretty tired, not much energy	29
	d. Very tired, no energy	0
6.	At the end of the day, I usually feel;	
	a. Very lively, full of energy	10
	b. Pretty lively, some energy	24
	c. Pretty tired, not much energy	57
	d. Very tired, no energy	10
7.	How often are your daily activities limited by fatigue or pain?	
	a. Never	5
	b. Often	10
	c. Sometimes	81
	d. Most of the time	5
	e. Always	0
8.	If you ate more food than you feel you should have, or ate too much starch, fat or sugar, why did you do it?	
	a. I was hungry	48
	b. The healthy foods don't fill me up, or don't taste good	29
	c. The healthy foods cost too much	14
	d. I was stressed	0
	e. I was bored	5
	f. I was sad	0
	g. Other	5
9.	During the last week, how often did you exercise (walking counts) for at least 20 minutes a day?	
	a. Every day	33
	b. More than 5 times a week	5

	Survey Items	Percent
	c. 3–5 times a week	10
	d. 1–3 times a week	29
	e. No exercise this week	24
10.	Why did you not exercise more?	
	a. Too tired	21
	b. No time	26
	c. No safe areas	26
	d. No one to exercise with me	0
	e. Other	0

Table 1

Anthropometrics Data

ID	Weight (lb)	Wt (kg)	Height (in)	Height (m)	Height Squared	BMI	BP	P	RBS
1	140	64	63	1.60	2.56	24.82	120/65	72	378
2	--	--	--	--	--	--	140/85	66	225
3	156	71	58	1.47	2.17	32.63	105/70	78	222
4	248	113	62.5	1.59	2.52	44.68	140/80	80	265
5	157	71	61	1.55	2.40	29.69	150/72	95	265
6	152	69	61.5	1.56	2.44	28.28	142/90	76	156
7	175	79	69	1.75	3.07	25.87	120/75	66	411
8	164	74	64	1.63	2.64	28.18	112/60	70	177
9	188	85	59	1.50	2.25	38.01	215/80	72	131
10	168	76	67	1.70	2.90	26.34	122/60	66	494
11	257	117	70	1.78	3.16	36.91	130/78	78	552
12	201	91	70.5	1.79	3.21	28.46	150/77	90	247
13	132	60	59	1.50	2.25	26.68	165/87	80	217
14	225	102	68.5	1.74	3.03	33.74	120/75	66	154
15	186	84	62	1.57	2.48	34.05	150/85	78	159
16	195	89	62	1.57	2.48	35.70	145/80	72	324
17	154.5	70	63	1.60	2.56	27.39	90/58	60	295
18	157	71	64	1.63	2.64	26.97	132/70	72	500
19	143	65	61	1.55	2.40	27.04	145/70	60	530
20	163	74	62	1.57	2.48	29.84	132/70	72	134
21	117	53	61.5	1.56	2.44	21.77	110/75	90	350
22	197	89	65	1.65	2.73	32.81	100/70	60	213
23	135	61	60	1.52	2.32	26.39	120/80	66	159
24	172	78	61	1.55	2.40	32.53	118/78	66	93
25	133	60	59	1.50	2.25	26.89	140/75	78	386
26	201	91	67	1.70	2.90	31.51	130/90	66	227
27	148	67	60	1.52	2.32	28.93	250/95		232
28	141	64	65.5	1.66	2.77	23.13	120/80	66	211
29	--	--	--	--	--	--	180/90	102	460
30	--	--	--	--	--	--	--	--	--
Ave.	158	72	60	1.52	2.32	30.88	130/72	70	395

-- = participant not available for measurement