[原著]Characteristic features of sleeping habits of 3-year-old infants in Okinawa, Japan

Characteristic features of sleeping habits of 3-year-old infants in Okinawa, Japan

Tsugiko Gima[1)], Risa Shikenbaru[2)], Kumiko Tsujino[1)], Tomiko Hokama[3)], Fujiko Omine [1)], Yumiko Endoh [1)] and Yoko Tamashiro [1)]

[1)] *Graduate School of Health Sciences, University of the Ryukyus*
[2)] *Ryukyu University Hospital*
[3)] *Local International Cooperation and Gender-Equity, University of the Ryukyus*

(Received on July 22, 2013, accepted on April 7, 2014)

ABSTRACT

It is well known that sleeping habits of the infants affect not only their physical growth but also their mental development. However, reports on sleeping habits of infants in Okinawa prefecture are scarce, especially in regard to the awareness of parents' side on it. Based on it, we conducted a survey on sleeping habits of 3-year-old infants by questionnaires, and also focusing on the awareness of their parents on sleeping habits for their infants. We gave the questionnaires to 835 parents living in two cities, Uruma and Nago city in Okinawa, and got 501 valid responses (60.0%). It showed that the average sleeping time of the infants was 11 hours and 8 minutes, and the average bedtime, 21:40±0:40. The latter one was clearly divided into three: the early sleeping group who slept before 22:00 (50.3%), the late sleeping group slept after 22:00 (38.3%), and the irregular group slept before or after 22:00 (11.4%). The parents with the irregular sleeping group were indifferent to the adverse effect that they took out with their infants until the late night, and they did not care to limit the time to watch TV in the night. Such parents were seen more in those who were born in Okinawa than those in other prefectures, but there was no significant difference. The indifference of the Okinawan parents to sleeping habits of their infants may cause some affects to their infants in their future, so that we want to suggest that the countermeasure by the municipal level in Okinawa prefecture would be taken for the parents to take more care for the sleeping habits for their children. *Ryukyu Med. J., 33* (*1*～*3*) *29*～*40, 2014*

Key words: Okinawa, 3-year-old infant, society with night-oriented lifestyle, parents' awareness on infants' sleep, sleeping habits

INTRODUCTION

Okinawa belongs to the subtropics in its geographical situation, and it is often pointed out even in the regional newspapers that Okinawan people live in the night-oriented society that means they go out until late at night, although such behaviors were not so scientifically and surveyed or clarified yet so far [1, 2)]. It surely suggests that such affairs would affect the life of babies, infants and school children, especially bedtime in their sleeping habits.

The late sleeping habit causes ill effect on their daily rhythm [3, 4)] and Hayama et al. reported about it in their paper; 'simple education to establish sound sleeping of infants for the parents [5)]. In fact there is a report that the proportion of children's bedtime after 22:00 in Okinawa was highest in 3-year-old infants by 43.1%, and the national average by 31% [6, 7, 8)] . However, the definite reports on sleeping habits in Okinawa are very scarce, and

there is no report on the awareness from parents' side of it, beside our paper [9].

Based on these, this paper aims to reveal farther the sleeping habits of 3-year-old infants and awareness of the parents on it from other cities different from the cities where we conducted before. If the infants' sleeping habits were not as so good as it was said and parents' awareness was low, it would be necessary for us to appeal to the official organization to take countermeasure by municipal level on it.

MATERIALS AND METHODS

To get sleeping habits of 3-year-old infants and awareness of the parents on it, we conducted a survey with a questionnaire style on the parents who attended to health checkup with their children in two cities: Nago and Uruma city in Okinawa. The survey similar to what we did before [9], this time it was carried out from June to October, 2013. In advance of the survey we got approval from the mayors and the caseworkers for health checkup, we asked them to send by mail the questionnaires, a letter to request cooperation to the survey, and brochure on the health checkup to the parents. On the day of health checkup, the parents were asked to put the questionnaires into the collection box set in the checkup place, and we collected it from the box. For those who forgot to bring their own questionnaire, they were requested to refill it, with their approval to the cooperation.

For the bedtimes for both parents and infants, we asked the parents to describe the bedtimes at least 4 nights in a week.

The details of the contents we made by using some references [3, 10, 11] were as follows:

1) The basic attributes of the infants and its sleeping condition: age, sex, attendance to nursery, kindergarten or not, taking nap or not, bedtime, and sleeping time.
2) Family structure: number of family members, relationship to the infants, and households.
3) The parents' awareness on their own sleeping habits: going out at night, relation between job and sleep, or bedtime, sleeping hours, etc.
4) Physical and physiological knowledge on sleep: secretion time of growth hormone, influence by watching TV, effect to expose infant to sunbeam, relation between insufficient sleep and appetite, and thermoregulatory system, etc.
5) Behaviors to promote sleep of the infant: setting bedtime for infant, taking nap before 15:00, the time limit to watch TV.

STATISTICAL ANALYSIS

The data used for analysis were all got from the information by the parents. For the statistical analysis, SPSS Statistics ver. 21 was used. To examine the relationship among parents' basic attributes, the chi-square (χ^2) test was applied. The statistical significance was all set at the level less than 5%.

ETHICAL CONSIDERATIONS

It was told in advance to the parents that their cooperation to participate in this survey for our study was optional, and even if they refused cooperation, it would cause no demerit to them, and their identification, personal information, and privacy would be kept protected. We got an approval in advance of the survey from the ethical committee on the epidemiological research, University of the Ryukyus.

RESULTS

As described before, the data throughout this paper were got from the information by all parents, 501 in number, but the fathers' number was 14, too small compared to the mothers' number, 478, so in the analysis we did not divide them, but include them into one as the parents.

Also single fathers or mothers were also included as the parents.

Fig. 1 shows the bedtimes of the infants that were clearly divided into 3; the early, late, and irregular sleeping group and Table 1 shows its average bedtime.

1. Infants' basic attributes

Table 2 shows the situation of the infants' basic attributes. Of the 3-year-infants in this study, 267 were male, 234 for female. Among them, those who attended either of nursery and

Table 1 **Sleeping extents of the infants in the early, late, and irregular bedtime group**

Sleeping extents	Bedtime group		
	Early	Late	Irregular
Number of infants	252 (50.3)	192 (38.3)	57 (11.4)
Bedtime (Mean ± SD)	21:09 ± 0:23[a]	22:17 ± 0:26[b]	21:51 ± 0:30[c]
Range of bedtime	19:00 ~ 21:30	22:00 ~ 25:30	18:00 ~ 25:30
Sleeping hours (Mean ± SD)	11h23min ± 56min[a]	10h45min ± 56min[b]	11h21min ± 61min[a]

The numerals are number in the total respondents of 501, and the numerals in parenthesis are the percentages. The statistically significant different were taken horizontally. This should be seen together with Figure 1.

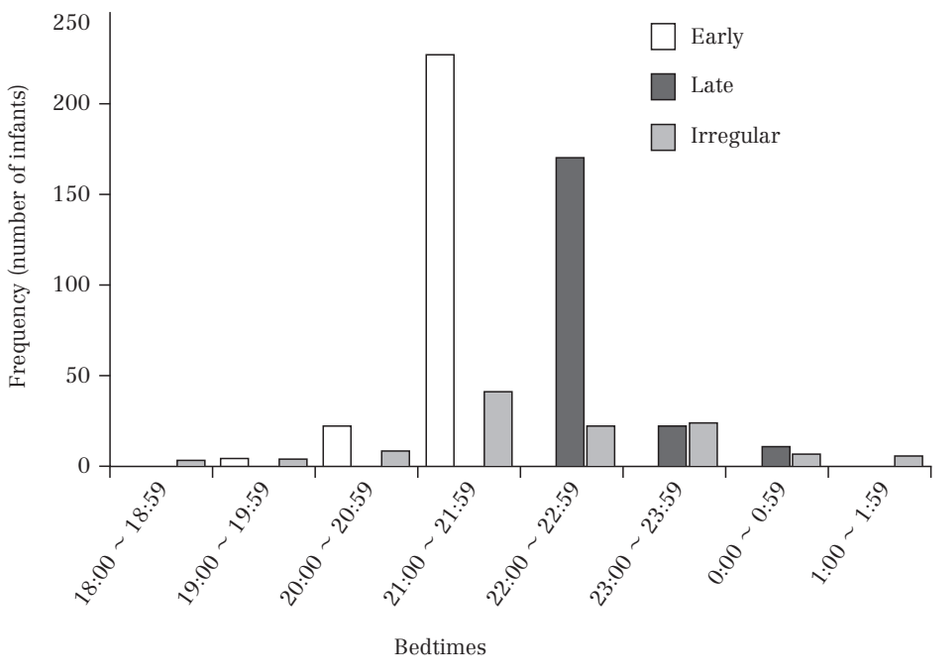

Fig. 1 **Bedtimes of the 3-year-old infants in Okinawa and its frequency on their different bedtimes**
The infants bedtimes were clearly divided into three; the early bedtime group who slept before 22:00, the late bedtime group who slept after 22:00, and the irregular group who slept, i.e., before and after 22:00. Their average bedtime and sleeping time were 21:40 ± 0:40, and 11h08min ± 60 min, respectively. The infants by the information from the parents were 478 for male, 14 for female and 9 unknown, and 501 in total.

kindergarten were 393 (78.4%) and 37 (7.4%), respectively, and those who did not attend were 64 (12.8%). There was no information on 7 infants (1.4%).

2. The family structures were composed of 2: two and three-generational households by 428 (85.4 %) and 73 (14.6%), respectively.
3. Bedtime of the infants, an average duration time for sleep, and situation of taking nap in daytime

When the bedtimes were analyzed for 501 infants as valid responses, the average bedtime was 21:40 ± 0.40, and the average duration time for their sleep was 11h08min ± 60min. The bedtimes of the infants were clearly divided into three as shown in Fig. l; the early sleeping group who slept before 22:00, the late sleeping group slept after 22:00, and the irregular group slept before or after 22:00. The early sleeping group was 252 (50.3%), the late sleeping group, 192 (38.3%), and the irregular group, 57 (11.4%), respectively, (Fig.1 and Table 1).

The infants who took daily daytime naps were 401 (80.0%), and those who got up from naps before 15:00 were 344 (73.8%).

4. Average values of the bedtimes and sleeping hours of the infants in the three groups with different bedtimes and the ranges of bedtimes

As the bedtimes of the infants were clearly

divided into three, the respective average values of the bedtimes (ranges of bedtime) of the infants in the early, late and irregular bedtime group were 21:09 ± 0:23 (19:00~21:30), 22:17 ± 0:26 (22:00~25:30), and 21:51 ± 0:30 (18:00~25:30), respectively.

The sleeping hours in the three groups were 11h23min ± 56min, 10h45min ± 58min, and 11h21min ± 61min, respectively (Table 1, Table 2). There were statistically significant differences in both the bedtime and sleeping hours in 3 groups.

5. Parents' basic attributes

Table 3 shows the parents' basic attributes. Among the valid responses from 501 parents, 478 (95.4%) were from mothers, and 14 (2.8%) from fathers. There was no information on 9 parents (1. 8%). In respect to the birthplace of the parents, 443 (88.4%) were born in Okinawa, and 47 (9.4%), outside of Okinawa, and the rest, 11 (2.2%), were unknown.

6. The parents' awareness in regard to their birthplace on bedtimes of the infants

As seen from this headline of the parents' awareness in regard to their birthplace on bedtime of the infants, we intended to see whether there were differences between the parents who were born in Okinawa or in other prefectures.

As Table 3 shows the parents' awareness on the bedtimes of their infants, 222 (50.1%) Okinawan parents were taking care of the early sleeping of their infants, namely before 22:00, while there were 27 (57.4%) parents from the other prefecture.

There was a higher percentage in the parents born in the other prefectures, but there was no statistically significant difference in regard to the parents' awareness on it.

7. The parents' awareness on bedtimes of the infants in regard to their educational background

The parents with the early bedtime group had a higher educational background. They were of junior college, business school, university, or graduate school. On the other hand, those with the irregular bedtime group were of junior or senior high school. So the parents with high or low educational background affected the bedtime of their infants by statistically significant difference.

Table 2 **Sleeping habits of 3-year-old infants in Okinawa based on the information by their parent and their basic attributes***

Attributes	Contents	Means and ranges, or Respondents (%)	Remarks
Average age	—	42.2 ± 1.3 months 36 ~ 47 months	
Sex	male	267 (53.3)**	#
	female	234 (46.7)	
Family structures	2 - generational households	428 (85.4)	#
	3- generational households	73 (14.6)	
Attendance to nursery, kindergarten or not	nursery	393 (78.4)	#
	kindergarten	37 (7.4)	
	no attendance	64 (12.8)	
	not answered	7 (1.4)	
Taking naps in daytime	taking daily	401 (80.0)	#
	aking 2-3 times a week	72 (14.4)	
	not taking	26 (5.2)	
	not answered	2 (0.4)	
Bedtime	—	21:40 ± 0:40	
Sleeping time	—	11h08min ± 62 min	

*: Total respondents were 501.
**: The numerals are number of the respondents and those in parentheses are percentages (%) to it.
#: In this paper as shown in Remarks, the matters in the attributes its relation to sleeping habits of infants were kept left for the future works.

8. The parents' awareness in respect to general aspects on bedtimes

In this headline, general aspects mean as follows as shown in Table 4: ①No good to go out after 22:00, ②Inevitable for the parents to give infants irregular bedtimes to some extent because of the parents' work or their other schedules, ③The early rising and early sleep are preferable, ④Preferable to teach infants sound sleeping habits, ⑤Insufficient sleep for the parents is unavoidable, ⑥Regular bedtime is preferable for parents, ⑦Shortened sleeping time reluctantly accepted in need.

These general aspects were given as the questions to the parents with the three groups; the early bedtime group, the late bedtime group, and the irregular group, and we made them to

Table 3 **Parents' attributes concerning to the bedtimes of their infants in regard to the three types of the bedtimes: the early, late, and irregular bedtime group**

Attributes		Bedtime group				Remark
		Total	Early	Late	Irregular	
		501*	252 (30.3)**	192 (38.3)	57 (11.4)	
Parents	Mothers	478	241 (50.4)	184 (38.5)	53 (11.1)	
	Fathers	14	8 (57.1)	4 (28.6)	2 (14.3)	
	Not answered	9	–	–	–	
Parents' mean age (year) range		486	33.7 ± 5.0 22 ~ 48	33.7 ± 5.1 22 ~ 45	33.9 ± 6.0 20 ~ 52	#
Not answered		15	–	–	–	
Occupation (only for the mothers)	On	337	171 (50.7)[a]	138 (40.9)[b]	28 (8.3)[b]	#
	Off	149	77 (51.7) [a]	46 (30.9)[a]	26 (17.4)[a]	
	Not answered	15	–	–	–	
Birthplace of the parents	Okinawa	443	222 (50.1)	170 (38.4)	51 (11.5)	
	Other prefecture	47	27 (57.4)	16 (34.0)	4 (8.5)	
	Not answered	11	–	–	–	
Educational background	Junior or senior high school	211	92 (43.6) [a]	84 (39.4) [a]	35 (16.6)	#
	College or: business school	219	119 (54.3) [a]	86 (39.3) [a]	14 (6.4)[b]	
	University or graduate school	64	38 (59.4) [a]	20 (31.3) [a]	6 (9.4)[a, b]	
	Not answered	7	–	–	–	

*: The numerals are total respondents.
**: The numerals number of the respondents and those is parentheses percentages (%) to it.
#: In this paper as shown in Remarks, the matters in the attributes its relation to sleeping habits of infants were kept left for the future works.
Statistically significant differences were vertically taken as shown in each heading with the alphabet written at the shoulders of the percentages in parentheses: Different alphabet shows statistically significant difference to each other by at least less than 5% level. The percentages with no alphabet or with same alphabet have no significant difference to each other.

answer either by 1) Quite agree, 2) Fairly agree, or 3) Disagree, for these questions.

And the answers were as shown in Table 4.

8-1. The parents' awareness on ①: No good to go out after 22:00

As Table 4 shows, when the parents were asked to answer this question that it is no good to go out after 22:00 with their infants, those who had the infants belonging to the early bedtime group answered " quite agree" by 64.9%, but those with the late bedtime group only by 47.1%, giving a significant difference.

It was also reversely true in the answer for "fairly agree" between both the parents' groups, 29.8% by the former and 46.1% by the latter.

8-2. The parents' awareness on ②: Inevitable for the parents to give infants in irregular bedtime to some extent because of the parents' work or their other schedules

If asked with the question like ②, the parents that would say "quite agree" would become less, because no one wants to force infant into irregular bedtime, so that the parents who would say in this survey "fairly agree" would become more. Such tendencies were seen as shown in Table 4: The parents with the early bedtime group who answered by "quite agree" were much less, but much more by "fairly agree", comparing to the other groups, giving a significant difference.

8-3. The parents' awareness on ③: The early

Table 4 **Parents awareness on sleeping habits of the infants in regard to their early, late, or irregular bedtime group**

General aspects	Bedtime Group	Quite agree	Fairly agree	Disagree
① No good to go out with infants after 22:00. (*n*=495)*	Early	161(64. 9) [a]**	74 (29.8) [a]	13 (5.2) [a]
	Late	90 (47.1) [b]	88 (46.1) [b]	13 (6.8) [a]
	Irregular	26 (46.4) [b]	25 (44.6) [a, b]	5 (8.9) [a]
② Inevitable for the parents to give infants irregular bedtime because of works. (*n*=494)	Early	3 (1.2) [a]	62 (25.1) [a]	182 (73.7) [a]
	Late	6 (3.1) [a]	65 (34.0) [a, b]	120 (62.8) [b]
	Irregular	1 (1.8) [a]	23 (41.1) [b]	32 (57.1) [b]
③ Early rising and early bedtime are desirable. (*n*=497)	Early	213 (85.2)	36 (14.4)	1 (0.4)
	Late	153 (80.1)	38 (19.9)	0 (1.0)
	Irregular	49 (87.5)	7 (12.5)	0 (0.0)
④ Preferable to teach infants sound sleeping habits. (*n*=495)	Early	214 (85.6) [a]	35 (14.0) [a]	1 (0.4) [a]
	Late	130 (68.4) [b]	57 (30.0) [b]	3 (1.6) [a]
	Irregular	39 (70.9) [b]	16 (29.1) [b]	0 (0.0) [a]
⑤ Insufficient sleep for the parents is unavoidable. (*n*=496)	Early	23 (9.2)	101 (40.6) [a]	125 (50.2)
	Late	32 (16.8)	67 (35.1) [a b]	92 (48.2)
	Irregular	7 (12.5)	29 (51.8) [b]	20 (35.7)
⑥ Regular bedtime is preferable for parents. (*n*=497)	Early	192 (76.8)	52 (20.8)	6 (2.4)
	Late	131 (68.6)	53 (27.7)	7 (3.7)
	Irregular	38 (67.9)	17 (30.4)	1 (1.8)
⑦ Shortened sleeping time reluctantly accepted in need. (*n*=495)	Early	96 (38.6) [a]	129 (51.8) [a]	24 (9.6) [a]
	Late	85 (44.5) [a]	77 (40.3) [b]	29 (15.2) [a]
	Irregular	28 (50.9) [a]	25 (45.5) [a, b]	2 (3.6) [a]

*: The numerals are total respondents.
**: The numerals are number of the respondents and those in parentheses are percentages (%) to it.
Statistically significant differences were vertically taken as shown in each heading with the alphabet written at the shoulders of the percentages in parentheses. Different alphabet shows statistically significant difference to each other by at least less than 5% level. The percentages with no alphabet or with same alphabet have no significant difference to each other.

rising and early sleep are preferable, and ④: Preferable to teach infants sound sleeping habits

It would be natural for the parents to permit that early rising and early sleep would be preferable to their infants, and to give a regular bedtime to their infants. The question ③ and ④ were just the same to it. However the answer to the question ④ was different. There was a statistical differences in the answering rates in the three groups (see Table 4).

8-4. The parents' awareness on ⑤: Insufficient sleep for the parents is unavoidable

The parents would be expected to have insufficient sleep, since they use to care of their infants. As Table 4 shows, however, when they ware asked whether their sleeping time was insufficient, most parents with the infants belonging to the early and late sleeping group answered with negative response by "disagree", by 50.2% and 48.2%, respectively. Only the parents of the irregular group answered with "fairly agree". In regard to the insufficient sleep, the parents of all the three groups answered with "quite agree" were about 9.2~16.8%. As a whole there were no statistics significant differences in the three groups.

8-5. The parents' awareness on ⑥: Regular bedtime is preferable for parents

Parents may hope or wish to have regular daily bedtime. When the parents of the three groups asked about it, their answers were almost same.

Table 5 **Parents' awareness on sleeping habits for the infants and its differences between the parents born in Okinawa and in other prefectures**

Questions	Birth place	Quite agree	Fairly agree	Disagree
1) No good to go out with children after 22:00. (*n*=487)*	Okinawa	243 (55.2) **	170 (38.6)	27 (6.1)
	Other prefectures	30 (63.8)	14 (29.8)	3 (6.4)
2) Preferable to teach infants sound sleeping habits. (*n*=487)	Okinawa	342 (77.7)	94 (21.4)	4 (0.9)
	Other prefectures	34 (72.3)	13 (27.7)	0 (0.0)
3) Shortened sleeping time reluctantly accepted in need. (*n*=487)	Okinawa	190 (43.2)	204 (46.4)	46 (10.5)
	Other prefectures	17 (36.2)	23 (48.9)	7 (14.9)

*: The numerals are total respondents.
**: The numerals are number of the respondents and those in parentheses are percentages (%) to it.

8-6. The parents' awareness on ⑦: Shortened sleeping time reluctantly accepted in need

Life of parents would depend on their children, especially when they were babies or infants. In regard to their sleep, they would be forced to shorten their sleeping time on requirements from their children. When the parents were asked about it, the answers were a little bit different among the three groups with statistically significant difference.

9. Awareness of the parents on sleep for their infants by their birthplaces

Table 5 shows the awareness of the parents on sleep for their infants by their different birthplaces. When they were asked whether it is no good for the parents to go out with infants after 22:00, those born in Okinawa and in other prefectures answered "quite agree" by 55.2% and 63.2%, respectively, with no statistically significant difference. Also the responded answers in "fairly agree" were reverse by 38.6% and 29.8%, respectively, with no statistical difference between them. These percentages showed that the parents' awareness on the infants' sleep was less regarded in the parents born in Okinawa.

In regard to teaching sound sleeping habits, there were no differences in its awareness between both the parents.

10. Parents' recognition on sleeping habits of their infants by different bedtime groups in physical and physiological views

This headline is just same to the title of Table 6. Among the questions on which they were asked from 1) to 9), there were no statistically significant differences in 1), 2), 3), 4), 6), 7), and 8). In the other questions; 5), and 9), however, different recognitions were observed in the parents with the early, late, and irregular sleeping group. Also as Table 7 shows, in the care taken by the parents with each different bedtime group to enhance the sleeping habits of infants, there were statistically significant differences among them.

11. Actions taken by the parents with the different bedtime group to enhance infants' sleeping habits

This headline is just same to the title of Table 8. It is to see whether the parents with each different bedtime group take different actions or not, when they were asked the questions as in 1) to 5) in Table 8. The results showed that the parents with irregular bedtime-infants took fewer actions with statistically significant differences, the parents with early bedtime-infants.

12. Urging the infants to take nap and its different action between the parents born in Okinawa and other prefectures

This headline is just the same to Table 9. When the parents were asked of whether they urge their infants to take nap before 15:00, the parents born in Okinawa answered "yes" more in percentages than those born in the other prefectures, by 75.4% and 62.2%, respectively, but there was no statistically significant difference.

Table 6 **Parents' recognition of the parents with the different bedtime group on sleeping habits of their infants in physical and physiological views**

Questions relating to sleeping habits for infants	Bedtime group	Recognized	Not recognized
1) Outdoor play in daytime surely enhances sufficient sleep for infants. (*n*=495)*	Early	222 (89.2)**	27 (10.8)
	Late	177 (93.2)	13 (6.8)
	Irregular	50 (89.3)	6 (10.7)
2) Late dinner may delay bedtime for infants. (*n*=495)	Early	214 (85.9)	35 (14.1)
	Late	153 (80.5)	37 (19.5)
	Irregular	41 (73.2)	15 (26.8)
3) Secretion of growth hormone mostly takes place from 22:00 to 2:00. (*n*=496)	Early	224 (90.0)	25 (10.0)
	Late	172 (90.1)	19 (9.9)
	Irregular	49 (87.5)	7 (12.5)
4) The infants taking breakfast become active, and its activity get them weary, so that they may easily get into sound sleep. (*n*=496)	Early	214 (85.9)	35 (14.1)
	Late	155 (81.2)	36 (18.8)
	Irregular	45 (80.4)	11 (19.6)
5) To limit the time to watch TV is preferable for infants' early bedtime. (*n*=495)	Early	218 (87.6) [a]	31 (12.4) [a]
	Late	164 (86.3) [a]	26 (13.7) [a]
	Irregular	40 (71.4) [b]	16 (28.6) [b]
6) Exposure to sunbeam after rising is good on adjusting biological clock and causing early bedtime for infants. (*n*=495)	Early	205 (82.3)	44 (17.7)
	Late	147 (77.4)	43 (22.6)
	Irregular	39(69.6)	17 (30.4)
7) To let infants cease nap before 15:00 affects bedtime of infants in the night. (*n*=488)	Early	205 (73.7)	40 (16.3)
	Late	163 (76.7)	25 (13.3)
	Irregular	45 (81.8)	10 (18.2)
8) Insufficient sleep may cause less appetite in the morning. (*n*=495)	Early	169 (67.9)	80 (32.1)
	Late	123 (64.7)	67 (35.3)
	Irregular	33 (58.9)	23 (41.1)
9) Late bedtime or a lack of sleep impairs thermoregulatory function for infants. (*n*=496)	Early	160 (64.3) [a]	89 (35.7) [a]
	Late	100 (52.4) [b]	91 (47.6) [b]
	Irregular	22 (39.3) [b]	34 (60.7) [b]

*: The numerals are total respondents.
**: The numerals are number of the respondents and those in parentheses are percentages (%) to it.
Statistically significant differences were vertically taken as shown in each heading with the alphabet written at the shoulders of the percentages in parentheses. Different alphabet shows statistically significant difference to each other by at least less than 5% level. The percentages with no alphabet or with same alphabet have no significant difference to each other.

Table 7 **Care taken by the parents with different bedtime group to enhance infant' sleeping habits**

	Bedtime group	Taken well	Taken sometimes	Not taken
Care taken of sound sleep for infant (*n*=494)*.	Early	225 (90.7) [a]**	21 (8.5) [a]	2 (0.8) [a]
	Late	108 (56.5) [b]	74 (38.7) [b]	9 (4.7) [b]
	Irregular	31 (56.4) [b]	21 (38.2) [b]	3 (5.5) [b]

*: The numerals are total respondents.
**: The numerals are number of the respondents and those in parentheses are percentages (%) to it.
Statistically significant differences were vertically taken as shown in each heading with the alphabet written at the shoulders of the percentages in parentheses. Different alphabet shows statistically significant difference to each other by at least less than 5% level. The percentages with no alphabet or with same alphabet have no significant difference to each other.

Table 8 **Actions taken by the parents with different bedtime group to enhance infants' sleeping habits**

Questions for actions	Bedtime group	Action taken	
		Yes	No
1) Exposing infants to sunbeam after rising in the morning (*n*=472)*.	Early	181 (77.4) [a]**	53 (22.6) [a]
	Late	131 (70.8) [a, b]	54 (29.2) [a, b]
	Irregular	30 (56.6) [b]	23 (43.4) [b]
2) Giving breakfast to infant almost every day (*n*=488).	Early	238 (97.7) [a]	5 (2.1) [a]
	Late	180 (94.7) [a, b]	10 (5.3) [a, b]
	Irregular	48 (87.3) [b]	7(12.7) [b]
3) To let infant take frequent outdoor play in day time (*n*=477).	Early	224 (94.9) [a]	12 (5.1) [a]
	Late	168(90.3) [a, b]	18 (9.7) [a, b]
	Irregular	44 (80.0) [b]	11 (20.0) [b]
4) To let infant cease nap before 15:00 (*n*=466).	Early	185 (79.4) [a]	48 (20.6) [a]
	Late	130 (72.2) [a]	50 (27.8) [a]
	Irregular	29 (54.7) [b]	24 (45.3) [b]
5) Limiting the time for infant to watch TV in the night (*n*=422).	Early	90 (43.3) [a]	118 (56.7) [a]
	Late	70 (41.4) [a, b]	99 (58.6) [a, b]
	Irregular	10 (22.2) [b]	35 (77.8) [b]

*: The numerals are total respondents.
**: The numerals are number of the respondents and those in parentheses are percentages (%) to it.
Statistically significant differences were vertically taken as shown in each heading with the alphabet written at the shoulders of the percentages in parentheses. Different alphabet shows statistically significant difference to each other by at least less than 5% level. The percentages with no alphabet or with same alphabet have no significant difference to each other.

Table 9 **To let infant cease nap and its difference between the mothers born in Okinawa and other prefectures**

Questions for actions	Parents	Action taken	
		Yes	No
To let infant cease nap before 15:00 (*n*=455)*.	Born in Okinawa	309 (75.4) **	101 (24.6)
	Born in other Prefecture	28 (62.2)	17 (37.8)
Limiting the time for infant to watch TV in the night (*n*=416).	Born in Okinawa	156 (41.4)	221 (58.6)
	Born in other Prefecture	10 (25.6)	29 (74.4)

*: The numerals are total respondents.
**: The numerals are number of the respondents and those in parentheses are percentages (%) to it.

DISCUSSION

1. General aspects

The people of Okinawa prefecture that locates in the subtropical area are regarded as composing a society with night-oriented lifestyle because of its hot climate. But we can't say anything at this moment about the relation between the sleeping habits of the infants and this society, because we did not give any questionnaires to the parents about the effects by it. What we can say just is on the estimation that such situations may cause an effect on sleeping habits not only of infants or children but also the young and old[12, 13].

The purpose of our survey is to reveal sleeping habits of the infants in Okinawa and what would be the awareness of the parents on it, for reports on sleeping habits of infants in Okinawa prefecture are scarce, especially in

regard to the awareness of parents' side on it.

Based on it, we conducted a survey on sleeping habits of 3-year-old infants by questionnaires, and also focused on the awareness of their parents on sleeping habits for their infants.

2. Three main themes of this paper

1) The first

One of main aspects of this paper is that we found the clear division of the bedtimes of the 3-year-old infants into the three types as seen in Figure 1 and Table 1. This clearly divided phenomenon could not see in any other papers, so that we want to stress here that this is a new finding about it. We believe that when bedtimes would be discussed from now on, these three groups should be mentioned for sleeping habits of infants or children.

The infants in the irregular group had a wider SD value in their average bedtime.

Interesting were almost the same in the sleeping hours among the three groups. In the previous survey [9], thought the sleeping times including daytime nap had no statistically different among three groups, it was different in the present one. It might be due to the regional characteristics of the southern, central and northern area.

2) The second

As the parents were divided into the 3 different bedtime groups in their infants, as shown in Fig.1, we thought it good to compare whether there would be different among the parents with these bedtime groups on awareness the sleeping habits of their infants.

Some were found to be different on awareness as general aspects, as shown in Table 4. In the question for the first aspect that it is no good to take out infants after 22:00, most parents with the early bedtime group answered “quite agree”, by 64.9%. On the other hand, those with the late or irregular group said so were 47.1 and 46.4%, respectively. This would mean that both the parents with the latter two groups took less care of the bedtime for their infants than the former parents. This phenomenon was similar to the previous one.

In general the parents of the early bedtime group took care more of the infants in its sleeping habits than those of the late and irregular bedtime group.

3) The third

Such differences of awareness of the parents should be discussed from the point of the difference of their birthplace, i.e., born in Okinawa or in other prefectures. As Table 5 shows, in the question 1) that is “no good to go out with children after 22:00” the parents born in other prefectures answered "quite agree" by higher percentages than those born in Okinawa. In the question of 2), and 3), that are "to teach sound sleeping habits to infants is preferable", and "shortened sleeping time reluctantly accepted in need”, however, the parents born in Okinawa answered "quite agree" by higher percentage.

The results in l) may show that the parents born in other prefectures took care more of the sound sleeping habits of their infants. And as the result in 2) and 3), the sleeping time of the parents born in other prefectures seemed to have been less disturbed, because their infants might be instructed much more to go to bed early.

As a whole, we could say that there were no statistically differences between both the parents, in which, however, there were different results in the previous survey [9]. For the different result between the previous and present survey, farther consideration would be necessary.

3. Different actions taken by the parents with different bedtime groups

As Table 8 shows, the actions given in 1), 2), 3), 4), and 5) were answered higher with an affirmative word of “yes” by the parents of the early bedtime group. These parents surely may promote early bedtime to their infants, and these actions could be granted as natural. These of bedtime group, in the previous survey, the results except 1) were similar to the present one.

In the parents’ action in 4); “to let infant take nap before 15:00”, the percentages with “yes” were higher in the parents of the early and late bedtime group than those of the irregular

bedtime group. The parents with the late bedtime group who said to their infants to cease not before 15:00 were more in its percentage than those with the early bedtime group, but there was no statistically significant difference between them. The parents with the irregular bedtime group were to some extent indifferent to action 4). This may show that it is not necessary for the parents of early bedtime group to dare say "go to bed early" to their infants, since they had had a habit already to go bed early. Such situation might cause the lower percentages by these parents.

For TV watching in 5), all the three groups who were limited it were less than half; the early bedtime group slept early in spite of limiting TV watching time or not, the late bedtime group were limited it for they slept late, and the irregular bedtime group slept irregularly for were not limited it.

4. The subjects to be solved in the future

In this paper, we described about the three main matters. Though other related matters on the sleeping habits of infants were as described in the results with Figure 1 and 9 Tables, we remained some of them as it was. For instance, we should discuss on sleeping habits of the infants, with the relations to the differences in the sex, the family structures, attendance to nursery or kindergarten, parents' ages, their occupations, educational backgrounds, etc[14, 15, 16]. If we describe and discuss all of them, the purpose we were aiming at would be diffused so much[4, 17]. In the Table 2 and 3, the remained matters were marked with "#" as for the future works. In addition to that described above, what we discussed here should be compared among the 4 cities; Naha, Urasoe, Nago, and Uruma city, as a part of our future works.

CONCLUSION

Although the results obtained in Nago and Uruma city were similar as a whole to those in Naha and Urasoe, there are three for us to want to stress in this paper. The first one is that there was the clear division of the bedtimes of the 3-year-old infants into 3. These clearly divided phenomena could not be seen any other papers, so that we want to stress here that this is a new finding about it. We believe that when bedtimes would be discussed from now on, these three groups should be mentioned for sleeping habits of infants or children.

For the second, there were some different awareness among the parents with these bedtime groups. In general the parents of the early bedtime group took care more of the infants in its sleeping habits than those of the late and irregular bedtime group. In the actions taken by the parents to promote early bedtime for the infants, the parents of early bedtime group limited the time for their infants to watch TV in the night.

For the third, the last, the parents born in other prefectures had higher awareness in giving sound sleeping habits of the infants than those born in Okinawa.

The indifference of the Okinawan parents toward sleeping habits of their infants may cause some affects to their infants in the future, so that we want to suggest that the countermeasure by the municipal level in Okinawa prefecture should be taken for the parents to take more care for the sleeping habits for their children.

ACKNOWLEDGEMENTS

We would like to express our deep gratitude to the parents and those cooperating to this study survey. Part of this work was presented in the annual meeting of the Okinawa Society of Child Health, 2013. This study was partially supported by a Grant-in-Aid for Scientific Research (B) 20390543, 2008(K.T.) from the Japan Society for the Promotion of Science.

REFERENCES

1) Council for problems of the youth in Okinawa prefecture: Let's cease late-night wondering of the youth, ～To establish desirable rhythm in the life～. Okinawa prefecture. 1996.
2) Okinawa compact dictionary, published by Ryukyu Shimpo-Co., Ltd. Japan. p. 428, 2003.
3) Kohyama J: The Effects of sleep on raising children. WAVE Publishers Co., Ltd., Tokyo. pp.16-161, 2008.
4) Kohyama J: Sleep and health promotion.

Japanese Journal of Pediatric Medicine.44: 1350-1353, 2012.

5) Hayama J, Adachi Y. and Tsuda A: Simple education on building infant sleeping patterns for mothers have a newborn baby. Japanese Journal of Behavioral Medicine. 16: 21-30, 2010
6) The Okinawa Society of Child Health, a public interest incorporated association: Report on health checkups for infants in 2010. p.106, 2012.
7) The Investigative committee on the level of health among infants in 2010, the Japanese Society of Child Health: A prompt report on the level of health among infants in 2010. The Journal of Child Health. 70: 448-457, 2011,
Available from URL: http://plaza.umin.ac.jp/~jschild/book/pdf/2010_kenkochousa.pdf
8) Social Welfare Service Coropreration, Royal Gift Foundatioin Mother and Child Narturance Society, Japan Child and Family Research Institute (JCFRI), Almanac of data on Japanease children 2012.
9) Gima T, Sikenbaru R, Tsujino K. and Hokama T.: A survey on sleeping of 3-years-old children in 2 cities of Okinawa(in Japan), The Okinawa Journal of Child Health. 40: 32-37, 2013.
10) Shirakawa S Ed.; Four hundred families from Tokyo, the state of sleep among families living in cities, the Research Institute on Sleep and Society. pp. 2-12, 2003.
Available from URL: www.hayaoki.jp/gakumon/tosi.pdf
11) Yano K, Ohhama K. and. Sanda M: The Relationship between sleeping behaviors of mothers and children, and its challenges. Kawasaki Journal of Medical Welfare. 17: 175-183, 2007.
Available from URL: http://www.kawasaki-m.ac.jp/soc/mw/journal/jp/2007-j17-1/12_yano.pdf
12) Hattori S. and Adachi T: Interrelatedness among bedtime of nursery school children, their parents' hour of getting home, and hours of their TV/video viewing after school. The Journal of Child Health. 65 : 507-512, 2006.
13) Maebashi A: Strategy development aimed at regular daily routines based on the analysis of infants' lifestyles (1). State of children's lives and related issues in Okinawa prefecture, Oasis of the Heart. 97: 17-21, 2011.
14) Suzuki M, Hiraiwa M. and Eto T: Sleep patterns in a child can affect the mother's attitude in daily life. The Journal of Child Health. 70: 495-505, 2011.
15) Mituboshi T, Nishimura K, Simizu S, Matumoto S, Ganno Y, Inoue E, Mohri I, Shimono K, Ohno Y. and Taniike M.: The factor which has an influence on a sleep habits and the sleep of Japanese infants. The Journal of Child Health. 71: 808-816, 2012.
16) Maeda A, Saito N. and Nakamura A: Effects of night-oriented life-style on the decline of eating competence and on physical conditions. Annual Report of Tohoku Women's College And Tohoku Women's Junior College.50: 43-48, 2011.
Available from URL: http://hrr.ul.hirosaki-u.ac.jp-dspace-bitstream-10634-6275-1-Tohokujyoshi_50_43.pdf.url
17) Tamura M, Kato R, Komuro K. and Numaguchi C: A Literature Review of Nursing Issue Concerning the Research of Infant Sleep. Journal of Japanese Society of Child Health Nursing. 15: 112-118, 2006.