

# Awareness of diabetic Children Caregivers about Complications of Type 1 Diabetes Mellitus in Dhahran, Saudi Arabia

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## Abstract:-

**Background:** Diabetes Mellitus (DM) type one is becoming more common across the world, and the number of new cases of diabetes is raising concerns about the development of acute and chronic problems. Complications have long been recognized as a primary source of significant morbidity and death in children with type one diabetes mellitus across the world. This study aimed to see how well diabetic children's caregivers were informed of the consequences of type one diabetes.

**Methods:** A cross-sectional study was conducted among children's parentages of youngsters with type one diabetics attending the King Fahd Military Complex in Dhahran.

**Results:** A total of 84 caregivers were included in this study, mothers were predominant to fathers (M= 95.2%, F= 4.8%). The research disclosed that most of the caregivers 51% had a fair degree of understanding regarding the acute complications of Type 1DM, while 44% had good knowledge.

There was a solid statistical correlation between educational level and awareness of type 1DM problems (p-value = 0.004), as well as a considerable difference in understanding scores between caregivers (p-value 0.032).

**Conclusion:** The data revealed that there was a statistically significant link between educational level and awareness of the consequences of type one diabetes, with fathers having the least knowledge. Diabetes teaching is an important aspect of diabetes care, and the health education department should focus on all areas of diabetes self-managing instruction.

**Keywords:**-Awareness, Caregivers, Diabetes Mellitus, Diabetic Children, Diabetes Complications.

## I. INTRODUCTION

Type 1 Diabetes Mellitus (T1DM) is one of the common endocrine disorders in children worldwide and it is accompanied by serious acute and chronic complications [1]. The incidence of childhood onset of diabetes is increasing worldwide [2]–[4]. 79,000 children are estimated to develop type one diabetes annually [5]. Concurring to the 8th edition of the International Diabetes Federation Atlas, the sum of young individuals less than 20 years alive with type one diabetes mellitus (T1DM) worldwide is estimated to be 1.106.500 million which is double the number cited in the previous diabetes Atlas [6]. Studies have shown that T1D incidence is increasing by 3-4% age every year and age at onset in children has become younger [7]. Saudi Arabia is ranked 7th in the world in terms of T1D prevalence and 5th in terms of incidence. T1D's precise etiology and current incidence trend are uncertain [8]. Other studies show a considerable rise in the occurrence rate of T1D in young individuals in Saudi Arabia, which is ranked eighth among the top ten nations for the number of children diagnosed each year, close behind the United Kingdom. T1D can lead to microvascular, neurologic, and macrovascular problems in the long run [1]. Retinopathy, nephropathy, neuropathy, and cardiovascular disease are the most frequent. "The Diabetes Control and Complications Trial" (DCCT) showed that diabetic children taking rigorous insulin treatment had enhanced glycemic control and a reduced complication rate. Retinopathy was decreased with 76%, microalbuminuria was lowered by 39%, and neuropathy was lowered by 60%. Complications have long been recognized as a main cause of substantial sickness and death in children with T1DM across the world, and they have a severe influence on individuals having diabetes' life excellence, due to an upsurge in disability and death [9]. Although children and adolescents with type one diabetes experience the acute effects of hypoglycemia and ketoacidosis daily, the disease's micro-

and macro-vascular complications worsen with time[10]. Maintaining adequate glycemic management and improving caregiver awareness and search for complications in T1D can help prevent or postpone problems [11]. Corresponding to the research, diabetes treatment is primarily dependent on patient knowledge and capacity to self-care in their everyday life, therefore health education is always an element of managing and restraint of problems. At the start of puberty and after 3 to 5 years of diabetes, appropriate surveillance of the early signs of microvascular illness should begin [12,13]. Therapeutic treatments, particularly strong metabolic management, may be extremely successful in averting the beginning of trouble or greatly slowing the course of complications. Diabetes problems are widespread, and they virtually treble the expenditure of controlling diabetes on an annual basis [14]. In type one diabetes, microvascular problems are a significant risk factor [15]. Control of hyperglycemia (target HbA(1c) level or = 7%) and hypertension (target blood pressure or = 130/80 mmHg) averts microvascular problems in both types of diabetes; a multifactorial approach that includes behavior modification and pharmacological therapy for all risk factors reduces the development of micro- and macro-vascular complications; and annual screening for dialysis prevents microvascular complications [16].

Type one diabetes puts you at a considerably increased risk of having major health complications. While diabetes-related health problems were practically a certainty in the past, the risks have considerably lowered with contemporary blood glucose monitoring, management, and therapy. Diabetes puts you at risk for a variety of significant health issues. Many persons with diabetes can avoid or postpone the onset of complications with improved knowledge, proper medication, and advised lifestyle modifications. According to several studies, careful glucose control substantially reduces the incidence of problems. Almost everyone with type one diabetes will acquire early-stage retinopathy after 20 years. End-stage retinopathy, which can lead to irreversible blindness, affects a tiny %age of people. Neuropathy affects up to 50% of patients with type one diabetes, which is extremely debilitating and a major cause of increased mortality. Damage to the nerve system makes it difficult to recover and frequently leads to amputation. Parents should be informed about the consequences of diabetes beginning at the time of diagnosis, and this knowledge should be reinforced throughout the follow-up period, because children are unable to take care of themselves regarding diabetic self-management. As a result, this study aims to examine diabetic children's parents' awareness of type one diabetes consequences.

## II. METHODS

The parents of children with T1DM who attended a diabetes clinic at the King Fahd Military Complex in Dhahran, Saudi Arabia, participated in this cross-sectional study. The participants had to be parents of a kid with type one diabetes who was in school age and eligible for treatment at KFMMC's diabetic clinic. The diabetes educator who works in the same clinic collected a convenient sample of

individuals who satisfied the inclusion criteria. After signing an online consent form, 84 parents of type one diabetic children completed an online questionnaire. The questionnaires were composed of 20 questions (seven linked to demographic data, nine closed-ended questions to measure knowledge, and four open-ended questions to assess conduct) and were administered between May and August 2020. The research team created a study questionnaire in basic Arabic language based on relevant literature. It was divided into three sections: the first dealt with socio-demographic factors, the second with basic diabetes information, and the third with caregivers knowledge and practices addressing diabetes complications.

Three pediatric nursing faculty members evaluated the research questionnaire for methodological validity and the pilot study for statistical validity. A correct response received a score of 1, while a bad answer received a score of 2. The caregivers' overall knowledge score ranged from 0 to 9 or 5 depending on the question for each knowledge item. Caregivers with overall scores of less than 4 out of 9 and less than 2 out of 5 were deemed to have inadequate knowledge. Individuals who got 6 or more points were deemed to have strong knowledge, while individuals who got 4-5 or 2 points were judged to have fair understanding. The relationship between factors and knowledge and behavior was also investigated. The data were analyzed using SPSS to create table graphs, and ANOVA was used to determine whether a p-value of 0.05 or less was significant (F test).

## III. RESULTS

In this study we include 84 caregivers of children with T1DM, with mothers outnumbering fathers (95.2% vs. 4.8%). Participants aged 20-30 years 9.5%, 31-40 years, 60.7 %, and over 40 years 29.8%. Concerning caregivers' educational level, 42.9% had a higher education, 36.9% had a secondary school education, 13.1 % had an intermediate degree, and 3.6 % were illiterate. 41.7% had the illness for 1-3 years, 31% for 4-6 years, and 26.3% for more than 6 years following diagnosis. The findings indicated that 44(52.4%) of the individuals have no family history of diabetes, whereas 35 (41.6%) have a family history of diabetes.

(See Table 1) In terms of participants' understanding of diabetes and its consequences, the survey found that 47 (56%) believe diabetes is a chronic illness, whereas 37 (44%) do not. Regarding the kind of diabetes their child has, 75 (89%) believe their child has type one diabetes. Concerning diabetes management, Medicine, diet, and exercise were mentioned by 49 (58.3%), medicine and diet by 21 (25%), and medicine just by 14 (16.7%). The typical blood sugar level is known by 79 % of people as shown in (Table 2).

Most individuals (51%) had a reasonable understanding of the acute complications of Type one DM, while (44%) had good understanding and (4%) had poor understanding (figure 1). Concerning hypoglycemia signs and symptoms in comparison, roughly 13% of participants had a high degree of understanding, 55% had a reasonable degree of understanding, and 32% had a low degree of understanding

(figure 2). Hyperglycemia symptoms and signs in comparison, roughly 13% of participants had a high degree of understanding, 55% had a reasonable degree of understanding, and 32% had a low degree of understanding (figure 3). When it came to chronic problems, the participants had a good degree of understanding (29%), a medium degree of understanding (34.52%), and a low degree of understanding (35.72%). (figure4). Most parents test their child's blood sugar using a device at home when it comes to caregiver behaviors linked to type one DM complications prevention. Approximately 73% of parents checked their child's blood sugar level three to four times each day. 68% of the subjects displayed acceptable conduct when it came to hypoglycemic emergency interventions. Regarding minimizing the risk of problems from their kind, 44% of participants demonstrate excellent conduct, while 56% do not. There was a statistically significant link between educational level and awareness of type 1DM problems.

#### IV. DISCUSSION

This study aimed to determine how well-informed pediatric type one diabetic caregivers are about type one diabetes and how they behave in terms of preventing acute and chronic problems. Its critical to identify the caregiver's understanding of diabetes type one problems since a diabetic kid can develop difficulties that can easily be avoided if blood sugar levels are kept steady and under control. Our data revealed that 3.6% of caregivers were illiterate, whereas 43% had earned a bachelor's degree. Research conducted in the Aseer Region to examine the knowledge and attitudes of juvenile type-1 diabetes moms about DKA found that 3.5% were illiterate, and 38% had finished university level education[17]. In terms of caregiver categories, our findings indicated that mothers outnumber fathers (95.2% vs. 4.8%) [18]. This contradicted the findings of another Abha research, which found that 49.6% of type one diabetes children's interviewed parents were moms, while 50.4% were fathers [19]. Considering caregivers' accurate replies to questions concerning hyperglycemia signs and symptoms, 32.14% have good knowledge, 45.24% have fair knowledge, and 22.62% have no knowledge. These findings matched those of a study conducted in Abha, Saudi Arabia to assess the knowledge of diabetes type one children about diabetes and diabetic ketoacidosis, which revealed that 29.6% of parents had good knowledge of diabetic ketoacidosis, 32.5% had fair knowledge, and 37.9% had poor knowledge [19]. Caregivers' correct replies on their understanding of acute complications were 44 % and 51%, respectively, for good and fair knowledge. And their reactions to diabetes's long-term consequences, 36 % had poor understanding, while 34.5% had fair knowledge. In terms of caregivers' proper replies to the normal blood sugar range, 94% are right. Most participants demonstrated positive behaviors toward preventing complications and frequently testing children's blood sugar, which might be connected to an adequate degree of awareness about the acute consequences of type one diabetes. 68% of the subjects required immediate hypoglycemic treatment. When it came to reducing the risk of complications for their children, 44% of participants showed good behavior, while 56% did not. This result was

consistent with our findings, which showed that most caregivers had a poor to fair level of awareness about type I DM and its complications.

#### V. CONCLUSIONS

The data revealed that most caregivers had a poor to fair understanding of type one diabetes and its complications; there was a very significant statistical association between educational level and understanding of type 1DM problems. According to this study, diabetes education is an important part of disease management, and the health education department should focus on all aspects of diabetes education, with a special emphasis on caregivers with low educational levels and fathers, so that their children can live a normal life and avoid Type I DM complications.

#### LIMITATIONS

Due to the poor motivation of the participants to participate in this study, the Covid-19 found it difficult to collect data from them, and several of the scheduled visits had to be canceled. Due to the poor response rate of the subjects, generalizability is not achievable.

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**Table 1: show demographic statistics are presented based on frequencies and percentages (n=84)**

Demographic Parameters	Frequency	Percentage
<b>The caregiver</b>		
Father	4	4.8
Mother	80	95.2
<b>Age group of Care giver</b>		
20 – 30	8	9.5
31 – 40	51	60.7
More than 40	25	29.8
<b>Caregiver's accommodation</b>		
Suburb	10	11.9
Town	74	88.1
<b>Education level</b>		
High School	31	36.9
Intermediate	11	13.1
Not educated	3	3.6
Primary	3	3.6
University	36	42.9
<b>Monthly Income</b>		
Less than 5000	13	15.5
5000 – 8000	20	23.8
More than 8000 riyals	51	60.7
<b>Period of Disease</b>		
1 – 3 years	35	41.7
4 – 6 years	26	31.0
More than 6 years	22	26.2
<b>Does anyone in the family have Diabetes?</b>		
Yes	35	41.7
No	44	52.4
Do not know	5	6.0

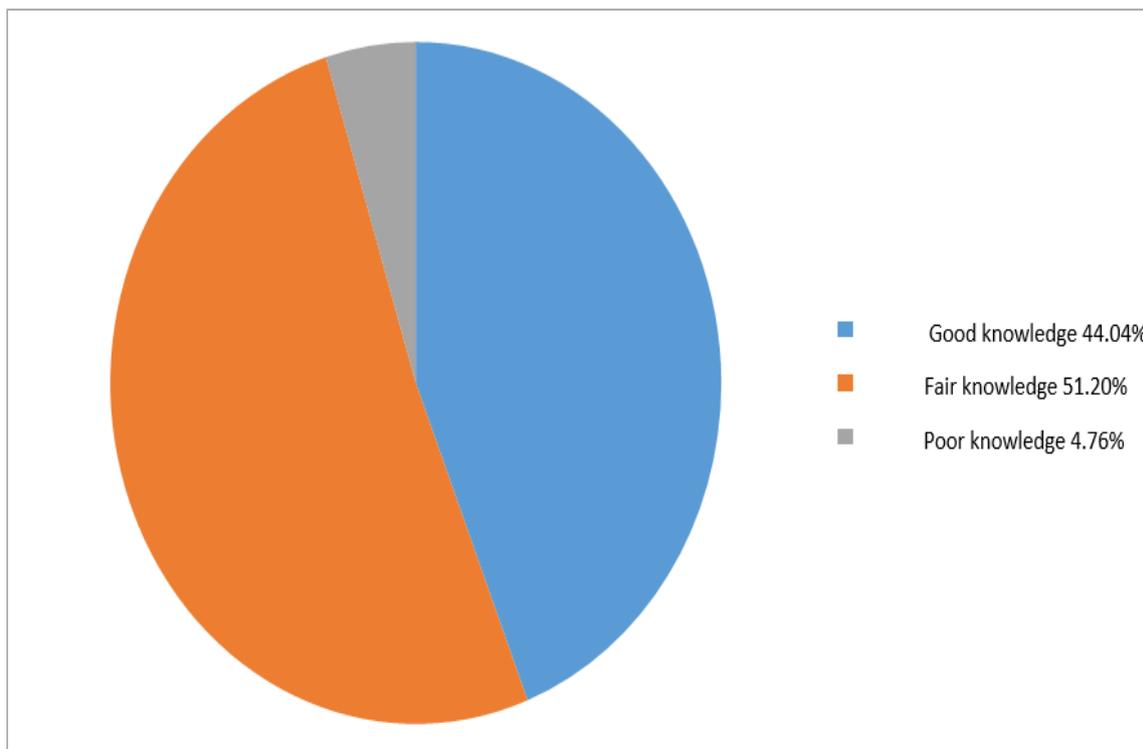
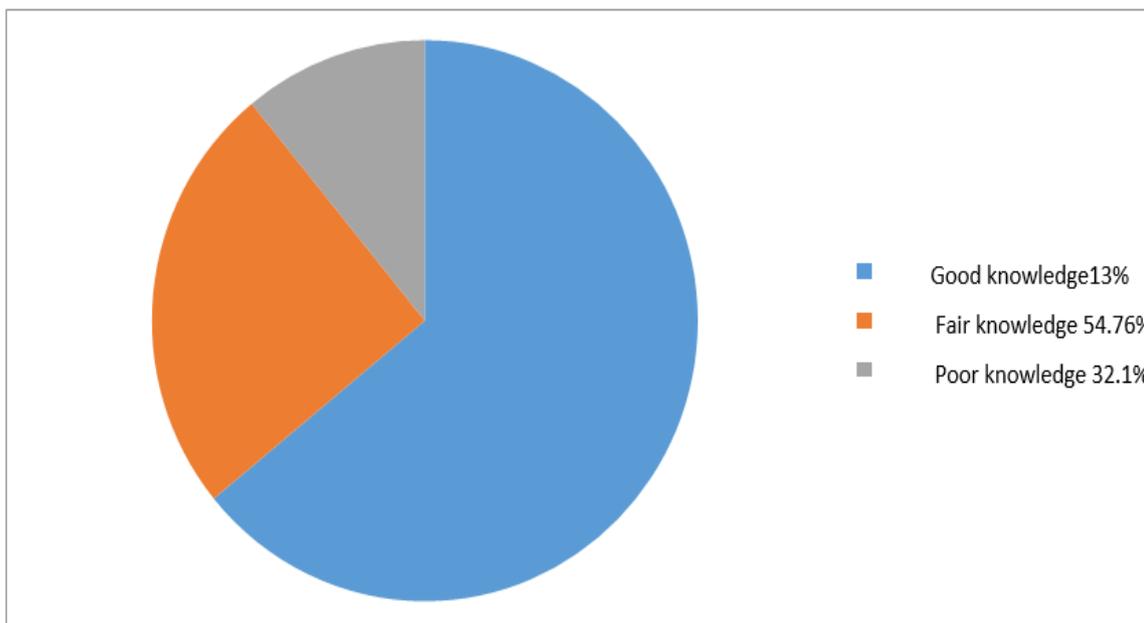


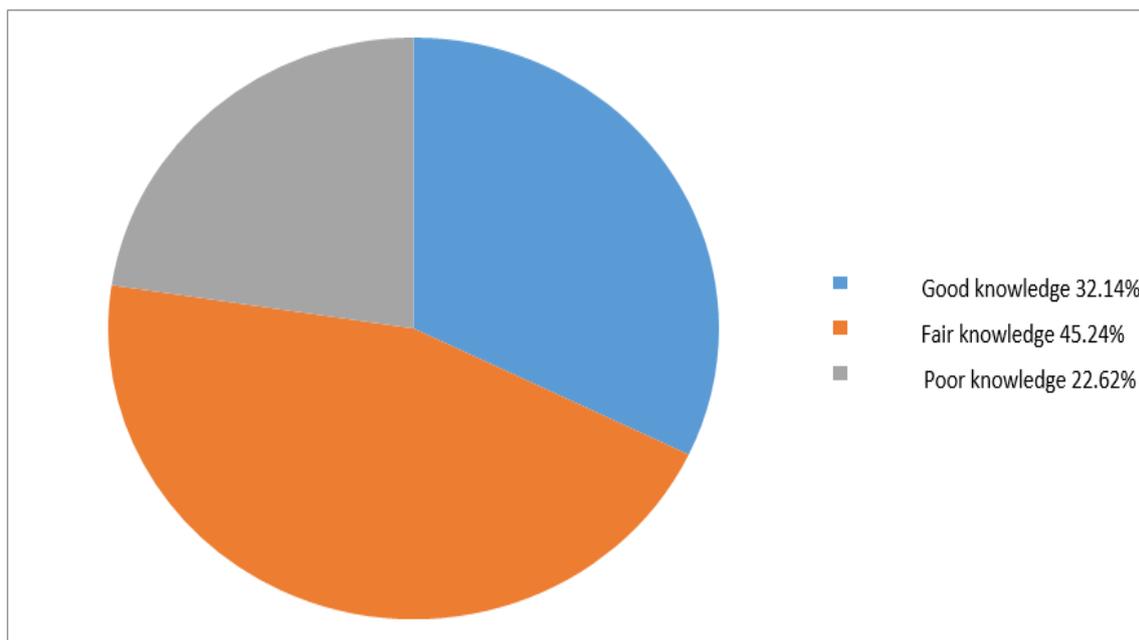
Fig 1. Level of participant's knowledge regarding the acute complications of type one DM (n = 84)

Variable	Frequency	Percentage%
<b>Q1. Is diabetes chronic disease?</b>		
-Yes	47	56
-I do not No	37	44
<b>Q2. Determine the type of diabetes your child suffers from.</b>		
-Type 1	75	89.3
-Type 2	2	2.4
-I do not No	7	8.3
<b>Q3. Diabetes treatment consists of Medicines, diet, and exercise.</b>		
-Medicine, diet, and exercise.	49	58.3
-Medicine, diet.	21	25.0
-Medicine only	14	16.7
<b>Q4. Type one diabetes can be treated by:</b>		
-Insulin injection.	78	92.8
-Insulin and pills.	1	1.2
-Pills.	1	1.2
-I do not No.	4	4.8
<b>Q5 Identify the normal blood sugar level.</b>		
Yes	79	94
No	5	6

Table 2: Degree of understanding regarding DM type one for every question (n = 84)



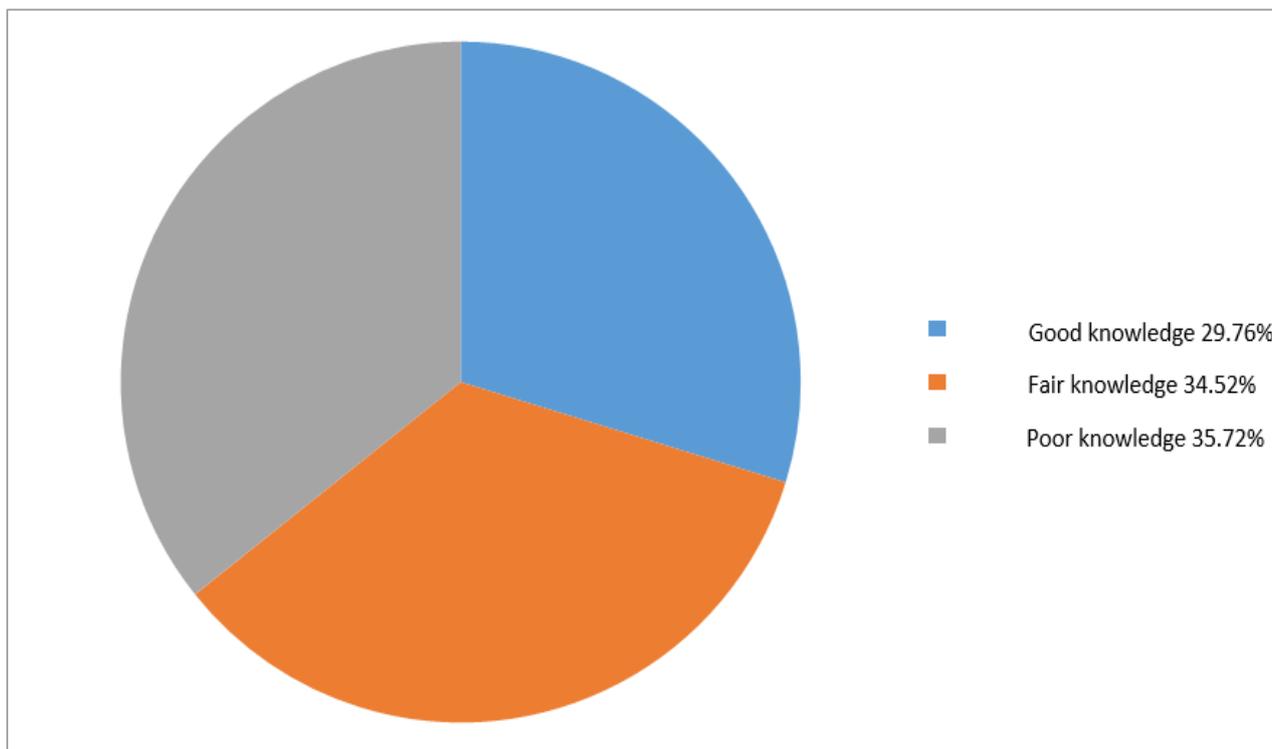
**Fig 2. Level of participant’s knowledge regarding signs and symptoms of hypoglycemia (n = 84)**



**Fig 3. Level of participant’s knowledge regarding signs and symptoms of hypoglycemia (n = 84)**

Variable	YES	Frequency	NO	Frequency
Q1. Do you measure your child's blood sugar with the device at home?	83	99%	1	1%
Q2. How often is your child's blood sugar level measured? (3-4 times per day).	61	72.61%	23	27.38%
Q3. What are the urgent interventions of the hypoglycemia (specify treatment steps).	57	67.85%	27	32.14%
Q4. Explain how to reduce the chance of complications from diabetes for your child.	37	44%	47	56%

**Table 3: Behaviors of the participants regarding prevention of DM type one complications (n = 84)**



**Fig 4. Level of participant's knowledge regarding chronic complications of the diabetes (n = 84).**