Zona Keperawatan: Program Studi Keperawatan Universitas Batam ISSN 2087-7285 [Print]
Volume 13, *Issue* 1, *October* 2022, *pp*. 29-38, DOI: http://dx.doi.org/10.37776/zk.v13i1 ISSN 2721-0170 [Online]
Available online at http://ejurnal.univbatam.ac.id/index.php/Keperawatan
Received August 2022; Accepted September 2022

Hyperglicemia with Hypertension of Patients at Botania Health Center Batam City

Denixon Pakpahan[1]*, Ana Faizah[2], Dedy Asep[3], Agung Ruhdiyat[4]
[1,2,3]*Department of Nursing Science, Faculty of Medicines, Universitas Batam, Riau Islands, Batam 29464, Indonesia.*
[4]*Department of Nursing Profession, Faculty of Medicine, Universitas Batam, Riau Islands, Batam 29464, Indonesia.*
denixon47@gmail.com; anafaizah@univbatam.ac.id; dedyasep59@gmail.com; agungruhdiyat@univbatam.ac.id.

**Corresponding Author:*
Denixon Pakpahan
E-mail: denixon47@gmail.com

Abstract

The incidence of hypertension in Indonesia tends to increase every year. In Batam, the incidence of hypertension in 2018 was 11,780 and the highest was at the Botania Health Center. Incidence of hypertension January-February 2018 totaled 517 sufferers. Based on the results of the researcher's interviews with 17 hypertensive patients, it was found that 8 of the 17 hypertensive patients were accompanied by hyperglycemia. Many factors cause hypertension, one of which is hyperglycemia (Tambayong, 2000). The aim of this study is to know the relationship between hyperglycemia and hypertension. Analytical Survey Design with a retrospective approach. The population is hypertension patients who take treatment at the Botania Health Center. Samples of hypertension sufferers who do treatment. Sampling technique with purposive sampling as many as 168. Observation sheets for hyperglycemia and checklists for hypertension. Location and time of study at the Botania Health Center June 1 - July 1 2019. Data were processed and analyzed using the chi-square test. The results show a p-value (0.383 > 0.05). The conclusion that there is no relationship between hyperglycemia and hypertension in patients. It is hoped that further research will pay attention to the methodology used (design, sampling and analysis test).

Keywords: Hyperglicemia; Hypertension

Cite this Article Pakpahan, D., Faizah, A., Asep, D. & Ruhdiyat, A. (2022). Hyperglicemia with Hypertension of Patients at Botania Health Center Batam City. *Zona Keperawatan: Program Studi Keperawatan Universitas Batam*, v13(i1), pp.29-38. Retrieved from http://ejurnal.univbatam.ac.id/index.php/Keperawatan/article/view/126

Zona Keperawatan: Program Studi Keperawatan Universitas Batam ISSN 2087-7285 [Print]
Volume 13, *Issue* 1, *October* 2022, *pp*. 29-38, DOI: http://dx.doi.org/10.37776/zk.v13i1 ISSN 2721-0170 [Online]
Available online at http://ejurnal.univbatam.ac.id/index.php/Keperawatan
Received August 2022; Accepted September 2022

Hyperglicemia with Hypertension of Patients at Botania Health Center Batam City

Denixon Pakpahan[1]*, Ana Faizah[2], Dedy Asep[3], Agung Ruhdiyat[4]
[1,2,3]Department of Nursing Science, Faculty of Medicines, Universitas Batam, Riau Islands, Batam 29464, Indonesia.
[4]Department of Nursing Profession, Faculty of Medicine, Universitas Batam, Riau Islands, Batam 29464, Indonesia.
denixon47@gmail.com; anafaizah@univbatam.ac.id; dedyasep59@gmail.com; agungruhdiyat@univbatam.ac.id.

**Corresponding Author:*
Denixon Pakpahan
E-mail: denixon47@gmail.com

Abstrak

Hiperglikemia dengan Hipertensi pada Pasien di Puskesmas Botania Kota Batam. *Insiden hipertensi di Indonesia cenderung meningkat setiap tahunnya. Di Batam insiden hipertensi tahun 2018 berjumlah 11,780 dan tertinggi di Puskesmas Botania. Insiden hipertensi Januari-Febuari 2018 berjumlah 517 penderita. Berdasarkan hasil wawancara peneliti kepada 17 orang pasien hipertensi, didapatkan 8 dari 17 pasien hipertensi disertai dengan hiperglikemia. Banyak faktor yang menyebabkan hipertensi salah satunya hiperglikemia (Tambayong, 2000). Tujuan penelitian diketahui hubungan hiperglikemia dengan hipertensi. Desain Survei Analitik dengan pendekatan retrospektif. Populasi adalah pasien hipertensi yang melakukan pengobatan di Puskesmas Botania. Sampel penderita hipertensi yang melakukan pengobatan. Teknik sampling dengan purposive sampling sebanyak 168. Instrumen lembar observasi untuk hiperglikemia dan lembar ceklis untuk hipertensi. Lokasi dan waktu penelitian di Puskesmas Botania 1 Juni - 1 Juli 2019. Data diolah dan dianalisis dengan Uji chi-square. Hasil menunjukkan p-value (0,383>0,05). Simpulan bahwa tidak ada hubungan hiperglikemia dengan hipertensi pada pasien. Diharapkan penelitian selanjutnya memperhatikan metodologi yang digunakan (Desain, sampling dan uji analisis).*

***Kata Kunci**: Hiperglikemia; Hipertensi.*

Introduction

Blood pressure is like the weather. Everyone's talking about it but not enough people are do something about it. High blood pressure or also known as hypertension silent killer because, on most cases, no showing any symptoms. Sick pressure-induced head bleeding is relatively rare. We knowing hypertension as wrong a major risk factor for heart attack and strokes. Every time we come doctor's office, pressure our blood is measured. However, that pathetic, despite the pressure the blood of millions of people is quite high to plunge them into at risk of heart disease, many of them are not control their blood pressure properly (Robert, 2010).

There are thought to be two reasons for the condition this is the first many people don't understand the function of blood pressure so don't consider it important, the second a

lot of people not willing to take medication which they thought they had many side effects, or they are not willing to leave style live this long for rule out risk factors doesn't seem too bothersome (Robert, 2010).

One billion people worldwide, that includes 50 million Americans affected by hypertension. Organization world health reports that blood pressure was associated with 62% cerebrovascular disease and 49% ischemic disease, hypertension is a risk factor death worldwide. For individuals aged 55-65 years without any other disease prevalence of hypertension as much as 90% (JAMA in Caplan, 2013). More than 90% of people with hypertension are idiopathic (essential), whereas 5- 10% can be ascribed identifiable cause (secondary hypertension).

Hypertension essential due to increase vascular reactivity and/or retention incompatible salt and kidney. Over the years, hypertension cause acceleration atherosclerosis of blood vessels major, obiterative changes and/or thinning and rupture of vessels small blood, as well as increased burden work on the heart (Caplan, 2013).

Hypertension can be defined as persistent blood pressure where the systolic pressure is above 10 mm Hg and diastolic pressure above 90 mm Hg. Hypertension defined as the systolic pressure 160 mm Hg and a diastolic pressure of 90 mm Hg (Hasdiansyah et al, 2016).

Based on World Health data Organization (WHO) in 2011 show a billion people in the world suffers from hypertension, two three of them are in the country grow with income low population currently. Prevalence of hypertension will continues to increase sharply and predictably in 2025 as much as 29% adults around the world have hypertension. hypertension has resulting in approximately 8 deaths million people annually, of which 1.5 million deaths occur in Asia Southeast, which is one-third of the population suffering from hypertension so can causing an increase in load health costs (Ministry of Health, 2017) In Indonesia hypertension tends increase.

Based on the results blood pressure measurement, Riskesdas (basic health research) 2013 prevalence of hypertension in residents aged 18 and over in Indonesia is equal to 31.7%. Meanwhile in 2018 shows that 34.1% of Indonesian population suffer from hypertension (Ministry of Health, 2018).

The risk factors for hypertension are age, gender, race, lifestyle (low education level, stress, obesity, coronary artery disease, hypercholesterolemia, hyperglycemi, atherosclerosis and lipid profile) (Tambayong, 2000).

Hypertension being number sequence three after ISPA disease (infection upper respiratory tract) and disease Nasopharyngitis, in 10 diseases the largest in Batam City. Based on Batam City Health Office profile in 2017 which amounted to 18.068 hypertension. Public health center Tanjung Sengkuang is the sequence first most sufferers hypertension, which amounted to 2.293 hypertension, next Rear

Padang Health Center with total 2.293, Tanjung Health Center Lucky with the number 2.334, Sei Panas Health Center with numbers 1522 sufferers, and health centers Botania with a total of 1.471 sufferers (Batam City Health Office, 2018).

Based on the results of data collection conducted by researchers on date March 18, 2019 it was found that hypertension is still a disease the most in Batam City number of hypertension sufferers 11.780 in 2018, Puskesmas Botania is the first order highest prevalence of hypertension namely totaling 1.965, next New Tiban Health Center, sufferer as many as 1.574 and the Sei Health Center Pancur as many as 1.143 patients hypertension (Batam City Health Office, 2018).

According to Tanto, et all in Winta (2018) diabetes mellitus which marked with hyperglycemia is one risk factors for hypertension. Based on ADA (American Diabetes Association) (2017) two of three patients with diabetes mellitus have high blood pressure. Cheung et all in Winta et al (2018) stated that Hyperglycemia is often accompanied by onset of the metabolic syndrome hypertension, dyslipidemia, obesity, endothelial dysfunction and factors trigger prothrombotic and exacerbate complications cardiovascular (Winta et al, 2018).

Mutmainah in Winta (2018) in previous research shows a relationship blood sugar levels with hypertension in type diabetes mellitus 2. Research conducted Raphaeli (2017) does not exist relationship between blood sugar levels while with blood pressure. Research conducted by Winta et al (2018) there is a relationship blood sugar levels with pressure blood in patients with diabetes mellitus type2. Based on the results of preliminary studies conducted by researchers on April 20 2019 at the Puskesmas Botania got that 517 hypertension in months January-February. Whereas based on the results of interviews with researchers to 17 hypertensive patients, the results of the interview were 8 of 17 hypertensive patients accompanied with increasing sugar levels blood.

Metabolic syndrome is a condition someone who is fat, suffers high blood pressure, and have high sugar and fat content in the blood. According to the World Health Organization (WHO) and National Cholesterol Education Program: Adult Treatment Panel III (NCEP-ATP III), people suffering from metabolic syndrome is someone who have abnormalities such as pressure high blood pressure more than 140/90 mm Hg, blood triglycerides more than 150 mg/dl, less HDL cholesterol than 40 mg/dl, central obesity with a BMI over 30, circumference waist exceeding 102 cm in men or exceeding 88 cm in women, or already exists microalbuminuria (Tandra, 2017).

Metabolic syndrome more and more found in modern society this. Sedentary lifestyle and a lot of eating causes more and more people are suffering diabetes, hypertension, obesity, stroke, heart disease, chest pain, and others (Tandra, 2017).

Chronic hyperglycemia in diabetes mellitus will have an impact on disorders of energy metabolism and

can cause premature aging and cell death (Patti et all in Sunarti, 2003) which finally causing various events macrovascular complications as well as microvascular. Individual with type 2 diabetes mellitus have a reduced life expectancy 15 years, and up to 75% of sufferers type 2 diabetes mellitus died due to macrovascular complications. More than 80% of deaths are related with diabetes mellitus occurs in low income countries and medium (Davis in Sunarti, 2004; Kharroubi et all in Sunarti, 2015).

In Indonesia, diabetes mellitus is the cause of death third after stroke and hypertension (Soewondo in Sunarti, 2013). Therefore, diabetes management mellitus focused deep control of blood glucose levels to prevent occurrence complications (Asdie in Sunarti, 2018).

Based on the background description in above, that hypertension is also related with increased etiological factors blood sugar levels (hyperglycemia), therefore the researcher intends relationship research hyperglycemia with hypertension in patients at the Botania Health Center 2019.

Methodology

Study Design. The research design used an analytical survey with a retrospective approach. The study population is patients hypertension who are taking treatment at the Botania Health Center. the research was carried out in 1 June – 1 July 2019. The sample in this study are hypertensive patients who take treatment at the Botania Public Health Center. The sampling technique used was purposive sampling, the number of samples at this study as many as 168.

Measures. Instruments used in this research is (Glukotest) easy touch to measure sugar levels blood and observation sheets for measuring blood pressure. For determine blood sugar levels divided into two categories, namely hyperglycemia (≥ 200 mg/dl) and not hyperglycemia (< 200 mg/dL). As for measuring Blood pressure is divided into four categories namely normal (<120/<80 mmHg), prehypertension (120/80-139/89 mmHg), hypertension stage one (140/90-159/99 mm Hg) and stage two hypertension (≥160/≥100 mm Hg).

Analysis. Data analysis was conducted using SPSS. Data on hyperglycemia and hypertency are presented in the form of frequency and percentage distributions, while the relationship between variables was analyzed using the Chi-square test. Decisions are based on numbers value, if the p value < 0.05 which means there is a relationship between variables independent with dependent, while the p value > 0.05 which means there is no relationship between independent variables with variables dependent.

Ethical Consideration. Ethical approval was obtained from the Faculty of Medical, Universitas Batam.

Results

The results of the research will be explained below includes the analysis univariate that describes the distribution the frequency of the variables independent and bivariate analysis explain relationships hyperglycemia with hypertension of

patients at the Botanical Health Center Batam City 2019.

Based on research that held June 1-July 1 2019 with a total of 168 students people. Based on the results of table 1. above can be explained from the known that out of 168 patients there were 65 experienced patients hyperglycemia (38.7%) and 103 non-experienced patients hyperglycemia (61.3%), which means from this study it was found that small number of patients suffer from hyperglycemia.

Furthermore, based on table 2 below it is known that out of 168 patients there was 1 normal patients (0.6) prehypertension with 87 patients (51.8) hypertension stage one 58 (34.5) stage hypertension two 22 (13.1), which means of this research found that highest prevalence of hypertension in the stage one hypertension category there were 87 (51.8%) people.

Next, Table 3 shows that there are 65 (100.0%) people who have hyperglycemia. From 65 (100.0%) that person exists 1(1.5%) in the blood pressure range normal and 32 (49.2%) in the range prehypertension blood pressure, 21 (32.3%) in the hypertension range stage one, and 11 (16.9%) hypertension stage two. Meanwhile there is 103 (100.0%) did not experience hyperglycemia. Out of 103 (100.0%) the person has 0 (0.0%) in the normal blood pressure range and 55 (53.4%) in the pressure range prehypertensive blood, 37 (35.9%) on hypertension blood pressure range stages one and 11 (10.7%) on hypertension blood pressure range stage two. After being tested with the test chi-square, obtained a p value of 0.383 (> 005) this means that H0 is accepted and Ha rejected. Therefore can concluded that no there is a relationship hyperglycemia with hypertension in Botania Health Center Batam City 2019.

Table 1. Frequency distribution of hyperglycemia in patients at the Botania Health Center Batam City (n = 168).

Hyperglycemia	Frequency	Percentage (%)
1. Hyperglycemia	65	38.7
2. No hyperglycemia	103	61.3
Total	168	100.0

Table 2. Frequency distribution of hypertension frequency in patients at the Botania Health Center Batam City (n = 168).

Hypertension	Frequency	Percentage (%)
1. Normal	1	0.6
2. Prehypertension	87	51.8
3. Stage one hypertension	58	34.5
4. Stage two hypertension	22	13.1
Total	168	100.0

Table 3. Relations hyperglycemia with hypertension in patients at the Botania Health Center Batam City (n = 168).

Hiper glikemia	Klasifikasi Hipertensi								Total	%	p-value
	Normal	%	Pre hipertensi	%	Hipertensi tahap satu	%	Hipertensi tahap dua	%			
Hiper glikemia	1	1.5	32	49.2	21	32.3	11	16.9	65	38.7	0.383
Tidak hiper glikemia	0	0.0	55	53.4	37	35.9	11	10.7	103	61.3	
Total									168	100	

Discussion

Hyperglycemia

Based on the results of this study It is known that from 168 respondents there were 65 (38.7%) who experienced hyperglycemia and 103 (61.3%) did not have hyperglycemia. Could concluded that the results of the study this most of the respondents did not have hyperglycemia.

This research is in line with research conducted by Ayla et al (2018), namely from 75 respondents there were 32 (42.6%) experiencing hyperglycemia and 43 (57.4%) respondents did not experience hyperglycemia. Hyperglycemia occurs where the levels glucose in the blood exceeds from normal conditions.

Hyperglycemia occur primarily as a result of decreased secretion or sensitivity insulin (Adam in Paradise. M, 2017). Hyperglycemia state can be chronic result in structural changes and the function of all organs incl kidney. Impaired kidney function caused by damaged vessels blood or renal units works to clean blood so in the end it becomes cause of complications for other organs when kidney function is impaired and will have an impact on rates creatinine. Creatinine comes from breakdown of muscle creatine phosphate. Rate blood creatinine shows kidney function better, more stable than blood urea levels. Elevated creatinine levels indicates a dysfunction in kidney (Firdaus. M, 2017).

Dietary changes and dietary adjustments important role in the effort control of blood sugar levels, in research obtained percentage more normal blood sugar levels much compared to hyperglycemia, that is indicates that some most of the respondents were able to do proper effort in control blood sugar levels.

Hypertension

From the results of this study that the majority of hypertensive patients are in the prehypertension category namely 87 people (51.8%) and is in the category of hypertension stage one there were as many as 58 people (34.5%) and 22 people (13.1%) have stage two hypertension.

This research is in line with research conducted by Lin Mutmainah (2013), out of 76 respondents obtained as many results 41% (23 people) went inside prehypertension category, then stage 1 hypertension category as many 32% (18 people), hypertension

category stage 2 as much as 25% (14 people) and normal category as much as 2% (1 people).

One can be diagnosed have hypertension on blood pressure measurement at least twice or more. Based on Joint National Committee VIII (JNC VIII), classification Blood pressure is divided into normal <120/<80mmHg, prehypertension 120/80 mm Hg – 139/89 mmHg, stage one hypertension 140/90 mmHg – 159/99 mmHg, and stage two hypertension > 160/> 100 mm Hg.

This happens for the most part respondent does not work, job can cause anything else that causes social class economic and personal characteristics. Stress will increase resistance peripheral and bulk vessels heart so it will stimulate sympathetic nerve activity. If pressure stress is too great so beyond individual endurance, will give me a headache, love it angry, and can't sleep, and cause hypertension. Respondents most don't have occupation and status as a housewife so that the respondents has no stress and responders no stress and finally respondent's blood pressure normal.

Relationship hyperglycemia with hypertension

Based on research results can it is known that the highest yield shows normal blood sugar levels with prehypertensive blood pressure as many as 55 respondents (53.4%) and 37 respondents indicated levels normal sugar with blood pressure stage one hypertension. Test results the hypothesis is done statistically with the chi-square formula denotes value p<0.383. This means that Ha is rejected and H0 is accepted. Where Ha is there is an association with hyperglycemia with hypertension in patients in Botania Health Center, while Ho there is no relationship hyperglycemia with hypertension in patients at the Botania Health Center. By therefore a conclusion can be drawn that there is no relationship hyperglycemia with hypertension in patients at the Botania Health Center.

This research is in line with research conducted by Raphaeli (2017). Results of the second analysis variable relationship between sugar levels blood under pressure blood in patients obtained values p=0.335. From these results it is concluded that there is none relationship between blood sugar levels while with blood pressure.

More cases of hyperglycemia found in women than with men, it is a possibility due to obesity. Total fat in women about 20-25 of total body weight is higher than male (Mutmainah in raphaeli 2017).

Obsity is a factor important risk occurrence of hyperglycemia. in people who are obese, due to input excess food, glands pancreas will work hard for normalize blood glucose levels due to food intake exaggerated. First the glands pancreas is still capable balance by producing more insulin, so blood glucose levels can still be kept normal. but on once a glandular beta cell the pancreas will experience fatigue and unable to produce enough insulin to offset the excess input calories. As a result, rate blood sugar will rise and finally will cause hypertension after diabetes mellitus occurs.

The risk factors for hypertension are age, gender, race, lifestyle (low education level, stress, obesity, coronary artery disease, hypercholesterolemia, hyperglycemi, atherosclerosis and lipid profile) (Tambayong, 2000).

This research was conducted on 168 hypertension patient respondents and results obtained 55 respondents experience blood pressure with normal blood sugar levels as a result of the majority of respondents are of the same sex male sex, and this research has a weakness that is not analyze the factors of obesity, stress level, coronary artery disease on respondents.

Conclusions

Most of the patients in The Botania Health Center does not experience hyperglycemia and those who do Most hypertension occurs in prehypertension range. There is no relationship between hyperglycemia and hypertension in patients at the Botanical Health Center in 2019.

Recommendations for further research need to be reconsidered by taking into account the appropriate methodology and the instruments used in the research variables.

References

Amirul, F. (2017). *Hubungan Kadar Gula Darah Dengan Tekanan Darah Pada Pasien Diabetes Melitus Tipe-2 di Rumah Sakit Umum Pusat Haji Adam Malik Tahun 2016*. Universitas Sumatra Utara: Skripsi.

Ardiansyah, M. (2012). *Medikal Bedah untuk Mahasiswa*. Jogjakarta: WA Press.

Baradero, M dkk. (2009). *Klien Gangguan Endokrin: Seri Asuhan Keperawatan*. Jakarta: Buku Kedokteran EGC.

Charles & Kilvert, A. (2010). *Bersahabat dengan Diabetes Tipe 2*. Jakarta: Penebar Plus.

DINKES Kota Batam. (2018). *Profil Kesehatan Kota Batam Tahun 2018*.

DINKES Kota Batam. (2018). *Rekap Laporan Pengukuran Tekanan Darah Menurut Jenis Kelamin, Kecamatan dan Puskesmas Kota Batam Tahun 2018.*

Fikriana, R. (2018). *Sistem Kardiovaskuler*. Yogyakarta: Deepublish.

Firdaus, M. (2018). *Diabetes dan Rumput Laut Cokelat*. Yogyakarta: Gadjah Mada University Press.

Goldszmidt, AJ & Caplan, LR. (2013). Stroke Esensial, edisi kedua. Jakarta: PT Indeks.

Kemenkes RI. (2013). *Riset Kesehatan Dasar, Riskesdas*. Jakarta: Balitbang Kemenkes RI.

Kemenkes RI. (2018). *Riset Kesehatan Dasar, Riskesdas*. Jakarta: Balitbang Kemenkes RI.

Kowalski, R. E. (2010). *Terapi Hipertensi Program 8 Minggu.* Bandung: Qanita.

Manuntung, A. (2018). *Terapi Prilaku Kognitif pada Pasien Hipertensi.* Malang: Wineka media.

Meylen S. (2014). *Hubungan Gaya Hidup dengan Kejadian Hipertensi di Puskesmas Kolongan Kecamatan Kalawat Kabupaten Minahasa Utara*. Universitas Sam Ratulagi Manado: Skripsi.

Novitaningtyas, T. (2014). *Hubungan Karakteristik (Umur, Jenis Kelamin, Tingkat Pendidikan) dan Aktivitas Fisik dengan Tekanan Darah pada Lansia di Kelurahan Makam Haji Kecamatan Kartasura Kabupaten Sukoharjo*. Universitas Muhammadiyah Surakarta: Skripsi.

Notoatmodjo, S. (2018). Metodologi Penelitian Kesehatan. Jakarta: Rineka Cipta.

Pediatri, S. (2010). Hipertensi pada Remaja. Salemba: Ikatan Dokter Anak Indonesia.

Raphaeli, Harris Kristanto. (2017). Hubungan Kadar Gula Darah Sewaktu dengan Tekanan Darah pada Pasien Diabetes Melitus Tipe 2 yang Baru Didiagnosis di Poliklinik Penyakit Dalam RSU Siti Hajar Medan Tahun 2015-2017. Universitas Sumatera Utara: Skripsi.

Rina, PS. (2014). Faktor-faktor yang Berhubungan Dengan Kejadian Hipertensi pada Penderita Rawat Inap di Rumah Sakit Umum Sari Mutiara Medan Tahun 2014. Stikes Imelda Medan: Skripsi.

Robert, EW. (2010). *Terapi Hipertensi: Program Menurunkan Tekanan Darah Tinggi dan Mengurangi Resiko Serangan Jantung dan Stroke Secara Alami.* Jakarta: Qanita.

Raymond, R. (2017). Faktor-Faktor Yang Mempengarui Kemiskinan Di Propinsi Kepulauan Riau. *Akrab Juara: Jurnal Ilmu-ilmu Sosial*, *2*(3), 14-24.

Raymond, R. (2018). Peningkatan Kinerja Pemasaran Melalui Pelatihan Perencanaan Bagi Kelompok Usaha Kerajinan Taufan Handrycraft Di Kota Batam. *J-ABDIPAMAS (Jurnal Pengabdian Kepada Masyarakat)*, *2*(1), 105-110.

Indrawan, M. G., & Raymond, R. (2020). Pengaruh Norma Subjektif Dan Return Ekspektasian Terhadap Minat Investasi Saham Pada Calon Investor Pada Program Yuk Nabung Saham Di Kota Batam. *Jurnal Akrab Juara*, *5*(3), 156-166.

Indrawan, M. G., & Siregar, D. L. (2021). Faktor Faktor Yang Mempengaruhi Kepuasan Pelanggan Smartphone Samsung Di Kota Batam. *Jurnal Ekobistek*, 81-87.

Rumengan, J. (2010). *Metodologi Penelitian dengan SPSS. Batam*: Uniba Press.

Rusdi & Isnawati, N. (2009). *Pedoman Hidup Sehat. Awas! Anda Bisa Mati Cepat Akibat Hipertensi & Diabetes*. Jogjakarta: Power Books.

Setiati, S dkk. (2015). *Buku Ajar Ilmu Penyakit Dalam Jilid I Edisi VI*. Jakarta: Interna Publishing.

Sunarti. (2018). *Serat pangan dalam penanganan sindrom metabolik.* Yogyakarta: Gadjah Mada University Press.

Tambayong, J. (2000). *Patofisiologi untuk Keperawatan*. Jakarta: EGC.

Tandra, H. (2017). *Segala sesuatu yang harus anda ketahui tentang diabetes.* Jakarta: Gramedia pustaka utama.

Winta. AE dkk, (2018). *Hubungan Kadar Gula Darah Dengan Tekanan Darah pada Lansia Penderita Diabetes Tipe 2*. Stikes Patria Husada Blitar: Skripsi.